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ABSTRACT

This study was conducted using archival data for 300 students of the graduating class of 1980 in a public school system which had a minimum competency testing (MCT) program. Data on normative variables (age, sex, race, and ability test scores) and performance variables (high school course of study, grade point average, absenteeism, and truancy) were collected and analyzed to determine the relationship between the variables and high school MCT scores. A significant relationship was found to exist for Language Arts and Reading MCT scores district-wide on designated test administration dates; a similiar relationship was found across all basic skill area MCTs across high schools. Although in several predictor equations, the variable course of study carried negative weights, the relative magnitude of the partial regression coefficients for course of study indicated the degree to which each course of study enhanced MCT scores. Other variables which appeared as statistically significant predictors of MCT scores were GPA, race, ability test scores, and age for district-wide MCT scores on designated test administration dates. By high school, other variables which appeared as statistically significant predictors of MCT scores were GPA, race, ability test scores, sex, age, and absenteeism. (Author/PN)

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THE RELATIONSHIP BETWEEN SELECTED NORMATIVE VARIABLES, PERFORMANCE VARIABLES AND HIGH SCHOOL MCT SCORES

CECELIA KUZNAK LYNCH

A Dissertation Submitted
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF EDUCATION

ILLINOIS STATE UNIVERSITY

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THE RELATIONSHIP BETWEEN SELECTED NORMATIVE VARIABLES, PERFORMANCE VARIABLES AND HIGH SCHOOL MCT SCORES

Cecelia Kuznak Lynch

161 Pages May, 1982

Selected normative and performance variables were studied to determine their relationship, if any, to high school MCT scores in a large public school system that had an MCT program.

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THE RELATIONSHIP BETWEEN SELECTED NORMATIVE VARIABLES, PERFORMANCE VARIABLES AND HIGH SCHOOL MCT SCORES

Cecelia Kuznak Lynch

161 Pages May, 1982

This ex post facto study was conducted using archival data on the graduating class of 1980 in a large public school system which had an MCT program. Data on normative variables (age, sex, race, and ability test scores) and performance variables (high school course of study, G.P.A., absenteeism and truancy) were collected and analyzed to determine the relationship between the variables and high school MCT scores.

Data were obtained for 300 subjects from student permanent records, student test record cards, and district federal reporting forms. The data were subjected to several multiple regression analyses, an analysis of variance and several t-tests for dependent samples using programs found in the Statistical Package for the Social Sciences (SPSS).

When multiple regression analyses were applied to the data, the resultant predictor equations for MCT scores indicated the variable course of study demonstrated a significant relationship with MCT scores. This relationship was found to exist for Language Arts and Reading MCT scores district-wide on designated test administration dates; a similiar relationship was found across all basic skill area MCTs across high schools. Although in several predictor equations, the variable course of study carried negative weights, the relative magnitude of the partial

regression coefficients for course of study indicated the degree to which each course of study enhanced MCT scores. Other variables which appeared as statistically significant predictors of MCT scores were G.P.A., race, ability test scores (STEA), and age for district-wide MCT scores on designated test administration dates. By high school, other variables which appeared as statistically significant predictors of MCT scores were G.P.A., race, ability test scores (STEA), sex, age, and absenteeism

Additional findings included significant differences in the levels of MCT achievement between pairs of high schools in the district. The pattern of significant differences between basic ckill area MCT scores was similar for the district and for individual high schools.

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C.K.L.

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CHAPTER I

INTRODUCTION

The Problem

Minimal comptency testing (MCT) has been called a panacea for a failing educational system, an attempt at truth-in-packaging, an effort to identify and certify competence in life skills, and just a "plain crazy idea." In addition, the issue of MCT has been the focus of hearings in Washington, D.C., legislative battles, and law suits. Amidst this controversy, the MCT movement has been recognized as a peculiar phenomenon insofar as what began as a startling idea in California, Florida, Oregon and other states in the mid-1970's remains one of the most explosive issues on today's educational scene (Thurston and House, 1981).

The interest in the MCT movement has generated large quantities of research into a wide variety of issues. Pipho (1978) reports the Educational Commission of the States has investigated the program aspects of MCT and program implementation strategies, the political ramifications of MCT policy, the range of provisions in MCT mandates, the uniformity of subject areas among state MCT mandates, and the degree of specificity on key issues in state MCT mandates. A symposium on MCT in 1979 focused on the concerns of what an MCT program should include and how an MCT program should be implemented (Bossone, 1979). Further, the symposium report indicated that there appeared to be little agreement among school districts as to the responsibilities of the schools for teaching specific content area skills (Block, 1979). There does, however, appear to be agreement among informed observers that the issue of MCT is here to stay (Pipho, 1978; Popham, 1976; Scriven, 1981).

Yet amidst this quantity of research, there are questions about curriculum and instruction which have heretofore been overlooked if one assumes that MCT can be a base for an educational program that will continue to affect the public schools. In 1979, Down suggested that the potential of MCT lies in its contribution for helping students and schools. MCT can be part of an early warning system to identify students who are not learning and who should become targets for immediate efforts to find other viable teaching strategies or develop specific forms of remediation. In recognizing the individual differences and educational needs of the students, MCT can assist in increasing a student's sense of responsibility towards learning. Schools benefit from well-planned MCT programs through the process of self-examination. The importance of the acquisition of basic skills is re-emphasized as well as the provision of dialogue opportunities between the governing public and the schools. Down's position points up the need for research on MCT beyond what has been done thus far if questions about curricular and instructional implications of MCT are to be addressed.

Little if any research has been done regarding the nature of the students who have progressed through MCT programs. Knowledge of the nature of students affected by MCT programs can be of particular importance to educators. This knowledge can contribute to efforts to make curricular and instructional decisions which ultimately influence the desired outcomes of an educational program. Specifically, Spady (1977) and Mitchell and Spady (1978) suggest that educational organizations need to shift away from program structures based on time and role concepts and towards structures based on outcomes or goals to be reached.

Thirty eight states have mandated MCT programs in an effort to focus educational programing on outcomes or goals to be reached (Pipho, 1981). These programs vary from state mandated competencies and tests to state recommendations for competency areas in which local districts should consider testing. Whatever the individual state recommendations may be, these efforts suggest a move towards educational programing that will ultimately affect a large number of students. For example, in Illinois, a study conducted by the research department of the Illinois State Board of Education (1980) indicated that by the end of the 1981-82 school year, 30% of the districts in Illinois were projecting a phase-in of some type of MCT program, with the potential for affecting 48.9% of the public school pupils in the state. Legislation signed by Governor Thompson in September, 1981 (HB 874), which prohibits denial of a diploma or promotion of a handicapped student on the sole basis of failing an MCT may somewhat affect those districts which presently have an MCT program in place or those districts who are anticipating implementation of an MCT program. However, given the large student population in Illinois public schools, MCT programs will still affect the regular classroom student and the achievement of the outcomes of educational programing. Although Illinois is illustrative of only one of the thirty eight states mandating MCT, the point remains that MCT programs will have widespread effects on students. Perhaps, the focus of future research should turn from the mechanics of MCT program development, implementation and mandates towards research on the nature of the students who are affected by MCT programs.

Strides in education over the past fifty years have resulted in the recognition of the necessity to consider individual student differences when making curricular and instructional decisions. If data is available to educators on those variables which are under the students' control, some responsibility for MCT performance may be directed towards the learner.

If, as research by Pipho (1978) suggests, the issue of local control plays a major role in the development of MCT mandates and programs, MCT programs can and should assume a greater diagnostic and prescriptive role for local districts. Ideally, educators would be able to predict what kind of student, based upon characteristics of students within the district, demonstrate successful MCT performance and which students in the district were unable to demonstrate successful MCT performance.

If a greater predictive capability is available, two purposes are served. First, this capability permits an evaluation of curriculum and instruction in light of those variables over which the school has some control. By directing educators to focus on the scope and sequence of educational programing, MCT data can serve as part of a feedback loop which reflects on the learning objectives, pre-testing, and learning activities.

Second, the ability to predict the probability of successful MCT performance allows a district to use the MCTs diagnostically. For those students whose characteristics demonstrate the potential for difficulty on MCT performance, the district should be able to 1) prepare proactive instruction that will lead to successful MCT performance; or, 2) offer reactive instruction through remediation tailored to overcome the problems that appear to inhibit successful MCT performance.

Despite these diagnostic possibilities, very little has been done to investigate student variables which might be related to MCT scores. The very lack of such investigations suggests an assumption that the same variables which have traditionally been shown to affect general academic achievement will also affect achievement on MCTs. This assumption may not necessarily be accurate.

The strength and order of influence of the student variables on achievement may be quite different in the case of MCT than in the case of general academic achievement. Previous investigations of academic success have often measured collegiate success, grade point average after high school and other variables associated with post-secondary educational pursuits that clearly reflect the acquisition of skills beyond the basics. In the case of MCT scores, academic success is measured by student performance on an evaluation instrument designed to measure achievement of basic skills at a minimum level for every student. The relevance of this attempt at evaluation is evident when a district elects to require a minimum level of performance of all students as a criterion for high school graduation.

In light of the emphasis on accountability and the various legal implications of MCT as reported by Carter (1979), a predictor model of student characteristics becomes a paramount concern to any district whose MCT results are tied to high school graduation requirements. The order and influence of the variables in the predictor model may become more important than the variables themselves for making decisions regarding remediation, program evaluation, and the quality of instruction.

It also becomes important to understand the differences among high schools on MCT scores in multi-attendance center districts. This information can supply an ordering of the influence of the student variables under consideration to guide the development of curriculum and instruction best-suited learners in a specific school. This can be accomplished by investigating the student charactersitics contributing to MCT scores, the differences in the order of student characteristics between and among the various high schools in a district, and the differences in the order of student characteristics between and among the several basic skill areas tested in an MCT program. Through an understanding of the variables which contribute the most and least to MCT scores, which schools demonstrate unique variable patterns, and which basic skill areas of MCT demonstrate unique variable patterns, educators can attempt to avert unsuccessful MCT performance and overcome deficiencies in curriculum and instruction.

Purpose of the Study

The primary purpose of this study was to investigate the relationship among two major categories of student variables and high school

MCT scores in a large public school system which has an MCT program. The two major categories of student variables chosen for investigation were normative variables and performance variables. Differences in the order of variable influence on MCT scores were investigated for (a) selected test administration dates, (b) individual high school MCT scores, (c) individual high school MCT scores as compared to district-wide MCT scores, and (d) individual basic skill area MCT scores.

Research Questions

In this study, the following research questions were pursued:

1. What is the order of influence of the normative variables and the performance variables on district-wide MCT scores on designated test administration dates?

2. What is the order of influence of the normative variables and the performance variables on MCT scores by high school on designated test administration dates?

3. Is there a significant difference in MCT scores among individual high schools?

4. Is there a significant difference in district-wide MCT scores among the three basic skill areas?

5. Is there a significant difference in MCT scores among the three basic skill areas by high school?

Operational Definitions

For the purposes of this investigation, the following operational definitions apply.

1. Minimal Competency Examinations-- Paper and pencil, five foil, multiple choice, no time limit, domain-referenced examinations

that include both life skills and school skills. In the district under investigation, there are three examinations: language arts (75 items), mathematics (81 items), and reading (81 items). The examinations are tied to instructional and learning diagnosis at grade 3, instructional and learning diagnosis and promotion at grade 8 and to graduation at grade 12. Students who complete all designated course work and state requirements must attain a passing score of at least 70% on each of the three minimal competency examinations to receive a high school diploma (Dugger, 1980). The high school competency goals and objectives for the MCTs in the district under investigation are provided in Appendix A.

2. Normative Variables -- the variables generally associated with investigations of academic success that are unique to the students. Normative variables are those student characteristics over which the schools or the students have little control (Lordahl, 1967). The normative variables in this study are:

a. Age -- The chronological age of the subject by year and month calculated from birth to the year and month of high school graduation.

b. Race -- The race of the subject as categorized by the U.S. Office of Equal Opportunity into one of five classes:

white, non-Hispanic
black, non-Hispanic
American Indian or Alaskan native
Asian,Pacific Islander
Hispanic

c. Sex -- Male or female.

d. Ability Test Scores-- The scores derived from the administration of the Short Test of Educational Ability (STEA). The STEA is a 55-item ability test by SRA which was devised as a sub-test of the Iowa Test of Educational Development (ITED). The STEA contains items which evaluate verbal meaning, arithmetic reasoning, letter series and symbolic manipulation (SRA, 1972). The test was administered by the district to the group of subjects during their sophomore year in October, 1977.

3. Performance Variables-- The variables over which the schools or students may exercise some control. The performance variables in this study are:

a. MCT Scores-- A percentage of correct responses on basic skill area tests.

b. Absenteeism-- Excused absence from school. The school district's administrative procedures on compulsory attendance (Peoria Public Schools, 1975) states that(1) requests by students to be absent from school shall be granted by principals only under the provisions provided for in the School Code of Illinois,(2) requests for students to be absent from school shall be made in writing by the parents at least 48 hours in advance,(3) requests by students to be absent from school to make visits to college campuses and job interviews shall be granted only in accordance with District practice,(4) requests by students to be absent from school for any of the previous reasons shall not be granted in excess of five (5) days during the regular school year,(5) it shall be the responsibility of the student to complete all make-up within the agreed upon time limits as established by school personnel and, 6) requests by students to be absent from school during semester examinations shall be denied.

c. Truancy -- Absence from school without legitimate reason. The school district's administrative procedure on truancy (Peoria Public Schools, 1975) states that students who are absent for reasons other than for personal illness, professional appointments, or important personal or family reasons shall be considered unexcused. Students who are unexcused shall not be permitted credit for make-up work which has been missed due to unexcused absence.

d. Course of Study -- An approved aggregate of classes which meets the requirements of the State Board of Education for the granting of a high school diploma. In the district under investigation, the courses of study available to high school students are as follows:

General Education
Business,Commercial
College Preparatory
Special Programs
Trades,Technical

A detailed description of the specific requirements of each course of study may be found in Appendix B.

e. Grade Point Average-- The numerical representation of a student's academic achievement derived through mathematical manipulation. The G.P.A. is based upon a 4 point scale, with 4.00 being the highest point of achievement and equivalent to the letter grade ~~of~~ A.

4. Graduation Requirements-- The achievement of at least 70% on each of the three basic skill areas of the minimal competency

tests, the accumulation of 16 credit hours in an approved course of study, and the successful completion of 4 years of English. These graduation requirements are specific to the district under investigation.

5. Certificate of Program Completion-- A verification of a student's completion of all graduation requirements except the passage of all three minimal competency tests. Students who successfully complete all graduation requirements except successful passage of all three minimal competency tests may elect to receive a certificate of program completion at graduation ceremonies with their senior class. Students in the state of Illinois are permitted to remain in school until age 21 to receive a high school diploma and students electing to receive a certificate of program completion may remain in or return to school to complete the requirements for a high school diploma.

Delimitations and Limitations of the Study

This study will be delimited in the following ways:

1. The MCT program investigated was in the Peoria Public Schools, District #150, Peoria, Illinois. The MCT component is a segment of a competency-based educational program implemented in the district in 1975.

2. Only regular division high school students from the graduating class of 1980 were included in the study. The graduating class of 1980 was the first class for which the MCT results were tied to high school graduation requirements in the Peoria Public Schools.

3. Process variables such as teacher-student classroom interaction, teaching methods, type and amount of remediation coursework

offered were not investigated.

This study will be limited in the following ways:

1. Student variables were investigated using archival data and were subject to the restrictions imposed by the availability of student records and the Peoria Public Schools Board of Education policies.

2. Only two major classes of student variables were investigated. Other variables such as socio-economic class, student attitudes towards the MCTs and post-graduation plans were unavailable.

Summary

Chapter 1 has introduced the need for research into the relationship between two categories of student variables and MCT scores. The research questions pursued in this investigation, the operational definitions, and the delimitations and limitations of the study were stated. Chapter 2 will consist of an extension of the rationale of the investigation through an examination of related research.

CHAPTER 2

RELATED RESEARCH

In this chapter, related research is presented in three sections. The first section deals with the background of the MCT movement; the second and third sections deal with previous research on the normative and performance variables which were considered in this study. Implications for this study are included in each section.

Background of MCT

Although the focus of this investigation concerned itself with a specific MCT program, a general description of MCT is necessary to clarify the parameters within which MCT may be defined. The following definition of MCT from the National Institute of Education hearings in Washington, D.C. (Thurston and House, 1981) provides a background which delineates the general characteristics of MCT programs.

> Minimum competency testing refers to programs mandated by a state or local body which have the following characteristics: 1) all or almost all students of designated grades are required to take paper-and pencil tests designed to measure basic academic skills, life or survival skills or functional literacy; 2) a passing score or standard for acceptable levels of student performance has been established; and, 3) test results may be used to certify students for grade promotion, graduation or diploma award, to classify students for or to place

students in remedial or other special services, to allocate compensatory funds to districts, to evaluate or to certify schools or school districts, or to evaluate teachers.

Haney and Madaus (1978) suggested that the movement towards competency testing reflected efforts by the educational community as called for by the governing public. Using competency testing as a vehicle, educators attempted to prevent schools from passing incompetent students through the grades purely on the basis of social promotion. Among the variety of schemes discussed, two general purposes of MCT have surfaced: (1) MCT used to control grade-to-grade promotions and (2) MCT used to provide a minimum basis for awarding a high school diploma.

Pipho (1978) reported when competency testing is used for either of these purposes, there are several implementation models from which to choose:

Model A: state standards with a state test

The Florida Educational Accountability Act of 1976 required students to meet state-established standards of proficiency in basic skills in order to earn a high school diploma. Although the Florida program was recently declared unconstitutional, this model still provided many viable recommendations for MCT programs of this type.

Model B: state standards with locally-developed tests

The state may mandate competency requirements or standards in this model, but leave it to local districts to devise ways of meeting the mandates through locally developed performance indicators. For example, Oregon adopted competency standards in 1972 and required local districts to submit plans to comply with state goals. The districts were then required to adopt competency statements and performance indicators in 15 content and life-skill areas by 1978.

Model C: local standards with locally-developed tests

In 1975, Colorado passed legislation which specified that local boards of education may require proficiency testing for graduation, using state provided guidelines to establish standards. This model permitted districts the flexibility of experimentation or maintenance of the status quo.

It is apparent that there is much variety in the models of competency testing available, with "competency" being defined differently by each state that has adopted an MCT policy. In Illinois, when the Illinois State Board of Education began discussing MCT during the 1977-1978 school year, the General Assembly was also discussing legislation that would mandate MCT. The Illinois State Board of Education concluded that MCT was a complex issue containing many unanswered questions and that it would be premature to support proposed legislation for MCT without further study. A report submitted to the Illinois State Board of Education (1980) concluded:

> As a consequence of the State Board's position, the proposed Illinois legislation was modified so that it closely paralleled the State Board resolution. The law was signed by Governor Thompson on August 31, 1978, and

required the Illinois State Board of Education to encourage local school districts to establish minimum competency testing programs and to provide to the local school districts procedures and materials to assist in the establishment of such programs by December 15, 1978 (PA 80-1412, formerly SB 238). The State Board was also required to submit a report on MCT to the General Assembly (p. 1).

Prior to the school year of 1979-80, 8.7% of the districts in Illinois reported that they had an MCT program in place. By December 1979, this number had increased to 9.6% and by the end of the 1979-1980 school year, the number had further increased to 16%. A survey by the Illinois State Board of Education (1980) showed that nearly 30% of the districts in the state had plans for implementing some type of MCT program by the end of the 1981-1982 school year. Since 1980, it appears there has not been a follow-up study in Illinois to verify the number of districts which have MCT programs in place.

The trend towards MCT has been widespread and may well have resulted from two themes prevalent in American education. The issue of educational control and responsibility and the issue of choice between the educational priorities of excellence and competency have contributed significantly to the MCT movement (Britell, 1980).

The issue of educational control and responsibility is evident in the demand by the controlling public that educators assume a greater responsibility for the results of schooling. Demands of precise evidence of success as well as failure have surfaced. Fueled by fiscal constraints, declining test scores and poor graduate performance, the public has been suspicious of any evidence or argument about education that is not quantitative.

In addition to the issue of educational responsibility, Cohen and Haney (1980) suggest the issue of educational priorities may also have contributed to the trend towards MCT. For many years, the system of public education has held a committment to the standard of educational excellence as a goal for all students to achieve. Given the variance among student abilities and other factors affecting achievement, the system has been unable to provide for the achievement of the standard of excellence for all students. The standard of educational competency, on the other hand, refers to the level of performance that citizens require to function in society. In light of the conditions which inhibit the achievement of the standard of educational excellence for all students, the standard of educational competency for all students may be a more realistic and egalitarian standard for the schools to achieve.

If the issue of educational control and responsibility and the issue of choice between educational priorities remain prevalent in the educational system today, these issues may reflect that Spady and Mitchell (1977) have identified as broad societal expectations which are responsible for the creation and maintenance of schools. These expectations dictate that schools should contribute to the development of adult characteristics thought to be important for the maintenance of society by:

1. Facilitating and certifying the achievement of technical competence,

2. Encouraging and enhancing the fullest possible development of physical, emotional and intellectual abilities and skills,

3. Generating and supporting social integration among individuals across cultural groups; and,

4. Nurturing and guiding each student's sense of social responsibility for the consequences of his/her personal actions.

The view one holds about the nature of an ideal society and how schooling contributes to the improvement of social conditions determines which of these outcomes is deemed by districts as most important for program development. When judgments are made about the importance of one outcome over another and schooling is charged with developing along these lines, the education is based upon fulfilling that expectation. Competency-based education (CBE) programs focus upon the demonstration of competencies identified as important.

One of the movements coincident to CBE has been MCT. There has been an increase in public concern regarding a decline in the technical competence of students graduating from high school. Declining test scores and other evidence of inadequate preparation of high school graduates for collegiate level work or job performance may have contributed to this public conern. This concern led many districts to seek some type of external objective assessment of student performance; hence the popularity of MCT. It must be stressed that MCT is not synonomous with CBE, but merely one of several components available as part of a total CBE program. To be most effective, MCT must be part of a CBE program because of its focus on technical competence. However, effective CBE programs may include an emphasis on more than technical competence and not possess a MCT element (Haney and Madaus, 1978).

A CBE approach concentrates primarily on developing strategies for improving technical competency while integrating elements of the other expectations. In general, CBE proponents advocate a curriculum based upon overt learning outcomes. Tyo (1979) reported that CBE is not predicated on "seat time" but rather on observable learning behavior. Through the use of criterion-referenced tests, a non-traditional curriculum, and a variety of learning activities, teachers are not forced to rely on intuition as to content and process decisions. Flexibility becomes a key factor in CBE as students strive to master learning rather than to compete against one another.

CBE is a broad approach which additionally attempts to coordinate school district goals with meaningful activities for those for whom the education is intended. The National School Public Relations Association study (1978) reports the CBE approach has key elements which include:

1. The insistence that a minimum (non-negotiable) set of outcomes (competencies) that are the desired results from school be defined in terms of the ability of students to function effectively in life roles outside of school.

2. The requirements that the attainment of this minimum set of outcomes be agreed upon and demonstrated as a standard for graduation

from high school; and

3. The requirement that student performance in relation to the minimum set of outcomes be summarized and maintained as a part of the student's permanent record.

Usually, in a CBE program, the required set of competencies are mutually agreed upon by the community and the school and the students are informed in advance of the competencies and performance levels which are expected of them. In addition, achievement is held constant and time varies in CBE, as opposed to traditional programs where time is held constant and achievement varies.

Spady and Mitchell (1977) have identified two types of CBE: reform CBE and accountability CBE. Reform CBE is a program in which there exists a basic faith in the judgment of the student to know what to learn and the best way to accomplish this task. In the reform CBE movement, the student chooses the goals and the ~~selection of~~ learning activities with the help of teachers and counselors.

Accountability CBE demonstrates a reversal of authority from reform CBE. It is a program imposed by higher authority; i.e., politicians to school boards, superintendents to principals, or teachers to students. This form of CBE purports to stop the passage of incompetent students through the system. MCT is most often associated with this type of CBE and, when part of a total CBE program should function as the evaluation instrument which verifies the acquisition of designated technical skills. In addition, schools would have the opportunity for self-examinations in developing objective assessments of student achievement.

Most of the research on MCT since 1975 has generated findings which fall into one or more of five different categories delineated by Pipho (1981). Research on each of the categories is discussed below.

First, the enactment of MCT mandates is a political issue which may permit the accrual of benefits to policy makers. The authorization for mandates and state control over education varies from one region of the country to another. Whether mandates for MCT originate from the state board of education, as in 24 out of the 38 states mandating MCT, or from the state legislature, both types of mandates carry the equal weight of the law.

Research (Pipho, 1981) indicates that in mid-America, local control over education means a minimum of state control or mandates. Decisions on curriculum/tests/instruction are relegated to local boards, with few states in the mid-West adopting a state test of minimal competency. Without state guidelines or firm mandates, the occasion for political opportunism arises. In Illinois, evidence suggests that it appears to have been politically advantageous to take an opposition stand on MCT on the grounds that attempts to mandate MCT erode local control. The outcomes of the mandate in this case are not examined qualitatively, but rather on the basis of whether the mandate would provide political benefits to policy makers (ISBE, 1980).

Second, there has been little agreement about what to include in a MCT mandate. In 1979, a Symposium an MCT held in Philadelphia summarized the findings and recommendations from a national survey on MCT. The 1977-1978 survey attempted to (a) identify those competencies which various segments of the population believed to be important for functioning adults; and, (b) ascertain which competencies should be taught in the schools. Bossone (1979) reports that the findings suggest that writing, language arts, reading, mathematics skills, and grammar appeared most often as those content areas in which competencies should be developed; however, the specific priority of these skills has yet to be determined. Further, there appears to be little agreement in this survey as to the responsibilities of the schools for teaching the specific content area skills.

Third, in those states with MCT mandates, there is little uniformity of subject areas designated in the mandates. Most MCT mandates focus on the basic skill areas of reading, writing and mathematics. However, at least two states' mandates do not initially specify any course requirements for MCT (Pipho, 1981).

A final report on the status of MCT (Pipho, 1981) indicated that more uniformity exists between state mandates under the heading of reading than under the heading of mathematics. In the latter skill area, two states focused on "arithmetic" (Idaho and Utah), five focused on "computational skills" (Arizona, California, New Jersey, Oregon and Wyoming) and two states make no mention of mathematics competencies at all (Indiana and Maryland). Further, writing is among the mandated competencies in nineteen states. Four states specifically mention spelling; language arts competencies predominate in the remaining states' MCT mandates.

Fourth, there is a wide range of provisions in MCT mandates. Pipho (1981) analyzed state MCT mandates for similiarities and differences on four key issues: type of test, implementation strategy, recommendations for citizen involvement and remedial programs. Two main difficulties Pipho encountered in his analysis were lack of specificity on key issues and ambiguity of wording. The results of the analysis indicate a broad range of specificity in the 38 state mandates on all of these issues. For example, the California mandate recommended an open-ended remedial program while the Arizona mandate called for specific plans for special instruction. Additionally, the variance on recommendations for type of test ranged from one or two words describing the type of test to detailed requirements for the use of specific norm or criterion-referenced instruments.

When the wording of the 38 state MCT mandates was compared, the results indicated there was not a single instance of identical wording in all 38 mandates. The Pipho report attributed this discrepancy to several factors which influence the scope and content of MCT mandates. These factors include the legitimate understanding of the issue of MCT by legislators, the biases held by members of the eductational community and the recommended solutions from constituents.

Fifth, the legality of MCT has not been fully addressed. School districts implementing MCT programs may find themselves caught between the rights of students and the rights of educators. There have been numerous challenges to MCT programs, most of which focus around the fairness of the testing procedure, viz., instruction, biases for or against certain racial, ethnic or special needs populations, failure to provide remedial services, and a lack of sufficient implementation time. Any MCT program must not infringe upon individual legislative and common law rights; yet the issue of the legality of MCT programs in relation to certain populations remains a concern still to be resolved (Haney and Kenyanjui, 1979).

Thus far, this chapter has reviewed research which dealt with background and programatic aspects of MCT. In Chapter 1 it was noted that Down suggested the potential for MCT lies in identifying students for whom curricular and instructional needs are not being met. Efforts to identify these students are dependent upon an understanding of what student variables contribute to MCT scores. For the purposes of this study, student variables were divided into two categories: normative variables and performance variables. Research related to these two classes of variables will be discussed in the following sections.

Normative Variables

Given that the normative variables chosen to be included in this study have been operationally defined as those over which the student or school has little or no control, the question arises: why include them in this investigation? Race, gender, age, and ability test scores have traditionally been evaluated in studies relating to academic success, with well-documented implications for education.

There is little reason to suspect that this investigation will counter the evidence of the relationship between race, gender, age and ability test scores and academic success. However, the position of these characteristics in a predictor equation can contribute valuable data as to their relative strength in effecting overall MCT performance and specific basic skill MCT performance. The position of these variables may lead to consideration of curricular or instructional modifications based upon knowledge of learning styles, locus of control, instructional activities or evaluation techniques coincident to these variables.

Maccoby (1974), Glickman (1976), Aiken (1976), Burton (1979) and Finnema (1974) have reported differences between males and females in academic achievement. Most of the research indicates that males and females have a relatively even start at school entrance. During the first several years of schooling, however, males appear to demonstrate a performance and adjustment decline relative to females that is evident in language arts skill acquisition by the end of grade 3. However, in mathematics skill acquisition, males are the favored achievers.

Research by Landsberger (1981) further revealed that males do not appear to attach themselves to school and school tasks to the affective degree that females demonstrate. In the Landsberger study of 300 third graders, both cognitive and affective measures correlated positively with school achievement for girls, while only cognitive measures demonstrated a positive correlation with school achievement for boys.

The relationship between race and academic success has also been well-documented. Psychologists have long debated about IQ differences between comparable groups of blacks and whites. The debates have centered around environmental disadvantages (Bloom, 1964; Hess and Shipman, 1965; Hunt, 1968; Riessman, 1962), cultural differences (Barnes, 1972; Clark and Plotkin, 1972; Lennon, 1970; Mercer, 1971, Williams, 1971, 1972) or hereditary deficiencies (Eysenck, 1971; Galton, 1869/1962; Goddard, 1912; Jensen, 1969, 1971, 1972, 1974; Shockley, 1972; Tanser, 1939). More recently, a 1978 survey by the National Assessment of Educational Progress indicated that black children aged 9, 13, and 17 scored from 10-20 percentage points below national averages on tests of reading, mathematics, science, social studies and career and occupational development (Golladay, 1978).

Farley (1977) suggested that perhaps racial disparities existed within the school setting that influence achievement. At grades 2-6 blacks and whites are exposed to roughly the same amount of schooling. Blacks tend to enter school somewhat younger than whites, yet by age 9 blacks are achieving at an age equal to whites. Farley's research further indicated that by age 16, the median grade placement for blacks was a full 30% of a grade lower than for whites.

Cresswell and Houston (1980) explored the differences among and between mathematics achievement of black, Chicano and Anglo eighth graders in the Houston, Texas school system. Their findings supported the notion that race was a significant contributor to variance in mathematics achievement; and while there may be methodological problems inherent in any initial study, clearly the possibilities exist for support of the results in the acquisition of minimal comptencies in mathematics.

Blattstein (1979) reported that sex differences in mathematics achievement existed initially or emerged by the end of the year for the subjects that were included in his study. Females demonstrated higher scores and greater gains in language arts skills while males demonstrated higher overall achievement scores on the Cognitive Test of Basic Skills. In addition, significant ethnic differences were demonstrated between whites and blacks and chicanos and blacks. The study appears to have indicated sex differences may not be modified by ethnicity. Sex differences arise primarily from the learning of sex roles and, in Blattstein's study, it was suggested that definitions of sex roles may be more similar than not among ethnic groups.

Hare (1979) reported in a National Institute of Education study that black females appeared to occupy a psychological and academic middle ground as compared to other groups of students. White females demonstrated higher reading and mathematics achievement than black females, yet black females demonstrated higher achievement scores in reading and mathematics than black males. In achievement orientation and self-esteem, black females' scores were significantly higher than black males. The scores of black males on non-academic dimensions such as social ability and peer esteem were significantly higher than the scores of black females on the same measures.

Matazarro (1972) reported that despite theories of cultural, hereditary or environmental differences, the fact remained that blacks, on the average, scored ten or more points below whites on standardized tests of intelligence and measures of academic achievement. His research raised another serious question: are the criterion-referenced MCTs culturally biased? Haney and Kenyanjui (1979) reported on the first round of testing under Florida's Functional Literacy Test. In the mathematics section, 23% blacks passed as compared to 76% whites. On the communications section, 74% of the blacks passed while 97% of the white students passed.

Down (1979) reported similar racial disparities in Virginia during the fall of 1978. An MCT in reading and mathematics was administered to 70,000 tenth graders. The failure rate for blacks was four times higher than whites and nearly double the failure rate of the next largest minority group, Asians. McKenna (1977) suggested that some of the racial disparity may be explained by the fact that criterion-referenced tests show a proclivity towards becoming normed. If this is the case, then those relationships suggested through comparisons of standardized testing results and race differences would again surface.

In light of such research, if indeed the strength and order of any of the variables demonstrate a significant relationship to MCT scores, the implications for educational programing are clear. Brickell (1978) suggested one of the tenets of an effective MCT program is a close linkage between instruction and testing. If, as a result of data supplied through this investigation, large groups of students are identified by a particular characteristic as belonging to a group for which this linkage is not being made, then the instructional program is in need of modifications to provide for the special needs of these students.

Performance Variables

The previous section has focused on research in two areas: 1) correlational studies involving normative student variables and general academic success; 2) descriptive studies involving normative student variables and specific MCT programs. There is also a body of research which has dealt with the relationship between performance student variables and academic success. The performance variables chosen for inclusion in this study are those over which schools or students may exercise some control: absenteeism, truancy, G.P.A., course of study, and MCT scores. Knowledge of the order of influence and the degree of strength of these variables may contribute significantly to the development of an effective educational plan of action for affecting MCT performance.

Research has indicated that student opportunity to learn appears to contribute significantly to academic success. The Rosenshine (1968) and Shutes (1969) studies demonstrated significant correlations between the extent to which material that was required to answer post-test questions was covered in the class lesson. Rosenshine suggested this area appeared most promising for research which investigates tests that measure transfer (comprehension level) items (Bloom, 1964). To this point, it should be noted that items on most MCTs require cognitive skills at the comprehension level or below. In the Rosenshine study, student opportunity to learn paralleled the performance variable of absenteeism. Absenteeism results in fewer opportunities for the student for learning; thus, the variable of absenteeism may play a significant role in the acquisition of even basic skills.

Stallings (1975, 1980) has demonstrated an interaction between low student absenteeism and higher scores on non-verbal, problem-solving tests in her investigations on academic learning time. Secondary students who had a history of failure demonstrated significant gains in reading achievement scores when they participated in classrooms in which there was supportive interaction between the teacher and the students. Implicit in this research is the suggestion that absenteeism and type of classroom interaction contributed to a lack of achievement for secondary students on certain measures of academic achievement. Although classroom interaction patterns have correlated positively with reading achievement for secondary students, a high degree of student absenteeism could prohibit the development of this relationship. Gains in reading achievement may be further truncated when truancy is the cause of the absenteeism insofar as truants are generally not permitted to make up academic work missed due to their truancy, thus further influencing academic achievement and skill acquisition.

Although the above studies appeared promising as supportive evidence for the inclusion of absenteeism and truancy in this study, little other research existed that supported the degree to which absenteeism and truancy affected performance. There may be an interaction of attendance and truancy with other variables which affect academic performance to a greater degree than attendance or truancy alone.

Sherman and Hoffman (1978), Nowicki and Roundtree (1971), Lessing (1969), and Crandall, Kalkovsky and Preston (1972) studied the relationship between G.P.A. and measures of academic achievement and found G.P.A. to be a more stable predictor of academic success than standardized test results. A differentiation was made in the research between momentary achievement (standardized test results) and continuing achievement (G.P.A.). Sherman and Hoffman suggested that continuing achievement be used as a predictor variable particularly when evaluating sex differences in academic achievement, as continuous achievement had demonstrated more stability in correlations of sex and academic acheivement. This stability has been attributed to the notion that G.P.A. better represented an affective measure of student's achievement. It is important, for the purposes of this study, that both momentary and continuous achievement be considered because both sex differences and achievement differences could demonstrate significant effects in a predictor model.

Course of study may additionally contribute to MCT performance. Students choose a specific course of study to pursue as one of the requirements for graduation from high school. The course of study has resulted from administrative decisions as to the efficacy of subjects, order and ease of scheduling, personnel requirements, state mandates, and other curricular, administrative and instructional factors. The course of study generally follows educational principles involving the scope and sequence of materials, with high school students studying the more basic skills of a content area during the freshman and sophomore years and progressing towards the more abstract concepts of a discipline during junior and senior years. In this manner, all skills should build upon previously learned concepts. If there appears evidence that this progression is not occuring, then the need arises for curricular modifications.

The variable of course of study had been chosen specifically to illustrate this point. In the school district chosen for this study, the MCTs are administered during the latter part of the first semester of the student's junior year. In all probability, a majority of the students taking the MCTs would have had during their freshman year or sophomore year at the latest, the mathematics and English courses which would have developed the basic skills tested on the MCTs. By the time the students took the MCTs, many had progressed into the more abstract thinking and concepts associated with a discipline. Unsuccessful performance on the first test administration date for some students may have been related to the length of time between instruction in basic skills and measurement. In addition, the G.P.A. of a student would indicated the degree of achievement in any given course of study. The significance of the relationship between course of study, G.P.A. and MCT scores may be used as a base for making revisions in educational programing that would affect MCT scores.

A 1978 HEW study reported that black enrollment in curricular tracks or course of study had shifted away from vocational/technical programs and towards general programs. Yet enrollment in academic tracks was 15-20% lower for blacks than might be expected. The analysis of the data may warrant a closer investigation of this variable and its relationship to MCT.

By contrast, Gelb reported in the 1972 National Longitudinal Study of the High School class of 1972 that substantial differences existed between academic and non-academic tracks or courses of study at the secondary level. This study recommended that detailed knowledge of curricular track placement had some value in explaining race and sex differences in academic achievement.

In his classic 1959 paper, Parsons described curriculum differentiation as a major mechanism by which secondary schools performed their function of selecting and allocating youth to adult roles. Supportive of this position, Alexander and McDill (1976) suggested that curriculum differentiation or track membership provided access to various educational resources and promoted or retarded achievement. College tracks were found to influence educational outcomes such as academic performance, encouragement from significant others, increased educational goals and self-conceptions of competence. Curriculum membership was found to mediate the effects of background characteristics such as father's educational level, mother's educational level, the number of books in the house, and the occupational status of the father. This research supported the notion that enrollment in college tracks has a high positive correlation with academic achievement. Interpretations of this relationship included the degree of interpersonal relationships with others who held education important and who conformed to the formal agenda of schooling. McDill further suggested that non-academic tracks did not enforce the importance of educational achievement to the degree that college curriculum tracks do.

Alexander and Eckland (1974) found that lower G.P.A.s existed across non-college curriculum tracks. Alexander, Cook and McDill (1978) suggested curriculum placement had important effects on educational outcomes in junior and senior years at the secondary level. The school process model used by these researchers supported the notion that curriculum placement served to both mediate the effects of status variables and contribute to educational outcomes.

Summary

In this chapter, a review of literature regarding the background of MCT has been presented. Additionally, the relationship between previous research and the variables identified in this study were noted and implications for the present study were suggested. The next chapter will discuss the procedures used in this study.

CHAPTER 3

PROCEDURES

The purpose of this study was to investigate the relationship between two major classes of student variables and high school MCT in a large public school system which has an MCT program. This chapter will focus on the design of the study and descriptions of the setting, subjects, and data collection procedures.

Design

This was a correlational study conducted in an ex post facto format using archival data on the graduating class of 1980 in a large public school system which has an MCT program. Three sources of data were used: student permanent records, student Short Test of Educational Ability (STEA) records, and computer printouts furnished by the Office of Research in the school district.

Student permanent record cards were on microfilm at the district administration building and contained the following data: student I.D., school attended, course of study, G.P.A., age, sex, absenteeism by semester and truancy by semester. The STEA scores for each subject were maintained in the district administration building on individual test record sheets. Computer printouts were made available which listed the MCT test record by I.D. number for each student in the class of 1980 and the race of each student in the class of 1980. The MCT test record for each student consisted of the chronological order of test attempts and the percentage correct on each test attempt for the basic skill area tests taken on that test administration data. The race of each student was listed on computer printouts which were government reporting sheets kept by the district.

Setting

The study was conducted in the Peoria Public Schools District #150, a charter unit district of 37.03 square miles located in the West Central Illinois city of Peoria. The district enrolled a total of 21,282 students during the 1979-1980 school year, with 13,227 students enrolled in the 32 elementary schools and 5,919 students enrolled in the four high schools and one alternative high school.

The racial/ethnic composition of the student population in pre-kindergarten through grade 12 during the 1979-1980 school year was as follows:

White	66.67%
Black	31.34%
American Indian	.07%
Asian	1.04%
Hispanic	.88%

During the 1979-1980 school year, the amended budget for the Peoria Public Schools totaled $48,674,675.00, including all federally reimbursed programs. The operational cost for each pupil was $2,250.61 and the tuition cost per pupil was $1,867.63.

To comple the MCT graduation requirement for the Peoria Public Schools, students were permitted to participate on any or all of the MCT test administration dates (TAD) until successful performance of 70% or above was demonstrated on each of the three skill areas: Language Arts, (LATAD), Mathematics (MTAD), and Reading (RTAD). Upon achieving a score of 70% or better on any basic skill area MCT, the students were not required to re-take that basic skill area MCT.

The Peoria Public Schools offered the MCT in all three basic skill areas on five separate test administration dates. The first opportunity for students to participate occurred at the end of the Fall semester of the junior year and will be described in this study as test administration date 1 (TAD 1). The second and third opportunities for MCT participation occurred at the end of junior year Spring semester (TAD 2) and during the summer between junior and senior year (TAD 3). Test administration dates four and five occurred at the end of the senior year Fall semester (TAD 4) and at the end of senior year Spring semester (TAD 5) respectively.

On TAD 1, students were required to take all three basic skill areas MCTs. They were not required to participate on TAD 2 or TAD 3. However, if students had not met the MCT graduation requirement by TAD 4, they were required to participate on that date, whether they had or had not enrolled in an optional semester-long remediation course. Those students who had not demonstrated successful performance on one or more MCTs after TAD 4 were required to enroll in a remedial course for Spring semester prior to TAD 5. Students who successfully accumulated 16 credit hours in an approved course of study and demonstrated four successful years of English but who did not demonstrate successful performance on all three basic skill areas of the MCTs were issued a certificate of program completion rather than a high school diploma during the commencement exercises in June, 1980.

Subjects

The class of 1980 was chosen for the focus of this investigation as it was the first district-wide class of graduating students that was required to meet the graduation requirements of successful MCT performance in addition to pre-existing graduation requirements. The population for the class of 1980 in the Peoria Public Schools consisted of 1405 students. As a first step in the sampling procedure, the population was classified by high school and by the test administration date at which the student successfully completed the MCT graduation requirement (TAD 1 through TAD 5). A category called test administration date 9 (TAD 9) was created which included those students who did not meet the MCT requirements prior to graduation. The data on table 1 reflect the number of students who successfully completed the MCT graduation requirements (TADs 1 through 5) and those students who did not successfully complete the MCT graduation requirement (TAD 9). Each line total represents the total number of students from each high school in the class of 1980.

As a second step in the sampling procedure, the number representing students in each TAD category by high school was divided by the number of the total population (1405). This step identified the percentage of the total population that was represented by the students at each TAD by high school. The computed percentages are displayed on table 1 and were used to determine the minimum number of subjects from the population drawn to represent each TAD and each high school.

Table 1

Summary of MCT Performance Data by High School
by Test Administration Date

School	TAD 1	TAD 2	TAD 3	TAD 4	TAD 5	TAD 9	TOTALS
Manual							
n	145	73	65	28	4	31	346
(%)	(10.3)	(5.2)	(4.6)	(2.0)	(.28)	(2.2)	(24.6)
Peoria							
n	139	82	42	20	5	37	325
(%)	(9.9)	(5.8)	(2.9)	(1.4)	(.36)	(2.6)	(23.0)
Woodruff							
n	151	32	31	7	4	14	239
(%)	(10.7)	(2.3)	(2.3)	(.49)	(.28)	(.99)	(17.1)
Richwoods							
n	405	54	14	11	5	6	495
(%)	(28.8)	(3.8)	(.99)	(.78)	(.35)	(.43)	(35.2)
	840	240	152	66	18	88	1405
	(59.8)	(17.1)	(10.8)	(4.7)	(1.3)	(6.2)	

As a third step in the sampling procedure, a total sample size of 350 was chosen because it represented approximately 25% of the total population and was believed to be a substantially large enough sample to be representative of the total population. Insofar as there existed pending court cases concerning the MCT graduation requirement between the Peoria Public Schools and students in the special education division in the district, only regular division students from the class of 1980 were included in this study. Students from the alternative high school also were not included in the study because the organizational structure and population of an alternative high school is unique. Results of this study would not be generalizable to the alternative high school population. Further, it was determined that because the population of students from TADs 4, 5, and 9 was small in number, the entire population from these TADs would be included in this study. This decision accounted for 172 Ss. To randomly select the remaining 178 Ss, copies of the computer printout of MCT student test scores were cut apart along student I.D. number and placed in large envelopes by high school and TAD. The I.D. numbers of students were drawn from these envelopes for inclusion in the sample. The number of subjects drawn from each high school for each TAD resulted in disproportionate sampling, but represented at least the percentage of those students in the total population as previously indicated on table 1. The sample sizes resulting from this selection procedure are displayed on table 2.

The originally identified sample size of 350 was reduced due to the unavailability of complete records on some subjects. Those students who dropped out of the Peoria Public Schools prior to graduation were dropped from the sample because incomplete records existed for these subjects. For TADs 1, 2 and 3 across high schools, those subjects dropped from the study were replaced by other subjects randomly drawn using the same procedure as that used to draw the original sample. This procedure succeeded in maintaining the

Table 2

Sample for Study by High School by Test Administration Date

School	TAD 1	TAD 2	TAD 3	TAD 4	TAD 5	TAD 9	TOTALS
Manual	18	13	13	28	4	31	107
Peoria	18	14	8	20	5	37	102
Woodruff	20	5	6	7	4	14	56
Richwoods	51	9	3	11	5	6	85
	107	41	30	66	18	88	350

originally determined number of subjects from TAD 1, 2 and 3 by high school. However, since the total population of students was used for TADs 4, 5 and 9, the subjects from these groups who dropped out of school or for one reason or another were excluded from the study, could not be replaced, thus accounting for a total loss of 50 subjects in the sample size. The final sample size was 300 subjects; the breakdown by high school, TAD and number of subjects lost in each category are displayed on table 3.

The distribution of secondary students by race and sex in the high schools of the Peoria Public School district as of June, 1980 is provided in Appendix C. This appendix should provide a reference point for comparing the distribution of the subjects by race and sex across high schools to the distribution of the population in the district by race and sex across high schools.

Table 3

Final Sample Size and Number of Students Lost from Original Sample Size by High School by Test Administration Date

School	TAD 1	TAD 2	TAD 3	TAD 4	TAD 5	TAD 9	TOTALS
Manual	18	13	13	17 (-11)	3 (-1)	21 (-10)	85 (-22)
Peoria	18	14	8	16 (-4)	5	34 (-3)	95 (-7)
Woodruff	20	5	6	3 (-4)	3 (-1)	5 (-9)	42 (-14)
Richwoods	51	9	3	8 (-3)	4 (-1)	3 (-3)	78 (-7)
	107	41	30	44 (-22)	15 (-3)	63 (-25)	300 (-50)

Data Collection Procedures

To reduce the possibility of keypunch errors and for ease of data analysis procedures, the data on the variables under consideration were hand-coded onto general purpose scanning forms. The data on these forms were then transferred to magnetic tape for data analysis procedures.

The data on the subjects as represented on the student permanent record card were the first to be collected and recorded on the op scan forms. The I.D. number of a subject was a five digit code whose first digit indicated the year of graduation. Students entering the Peoria Public Schools were assigned a permanent I.D. number and this number identified them throughout their years in the Peoria Public Schools. To further identify the subjects in this study by high schools, the number 1 (Manual High School), 2 (Peoria High School), 3 (Woodruff High School), 4 (Richwoods High School) was coded on the op scan forms preceding the I.D. number, thereby creating a six digit subject I.D. number. The TAD at which the student completed the MCT requirement was additionally coded on the op scan form as TAD 2, 3, 4, 5; or TAD 9 for those subjects who did not complete the MCT requirement. The ability to identify the subjects by high school and by test administration date permitted the analysis of differences between students attending each high school and among students on selected test administration dates.

The age of the subjects was recorded by years and months calculated from birth to the year and month of graduation (June, 1980). The three digit overall G.P.A. at graduation was recorded as well as total high school absences to the half day and total high school truancy to the full day. The course of study in which the student was enrolled was coded using a 1 (General Education), 2 (Business, Commercial), 3 (College Preparatory), 4 (Special Programs) or 5 (Trades, Technical). The sex and race of the subjects was recorded from the subject's permanent record card and U.S. Department of Health, Education and Welfare racial distribution reports, respectively.

In October, 1977, the district administered the STEA to the class of 1980. The scores for the subjects were taken from the results of this test administration and coded onto the scanning forms.

The variable of sex, which was originally coded as M-F was recoded as a numerical value (0=M, 1=F). The original coding of racial groups (11=white, 12=black, 13=American Indian or Alaskan native, 14=Asian, Pacific Islander, and 15=Hispanic) produced ordinal data. Due to lack of sufficient size for correlational procedures, these data were recoded so as to produce two groups: white (0) and minorities (1).

The MCT scores were coded for each subject using the following two-step procedure for each of the three basic skill area tests. First, the passing score to the hundredth of a percent was coded onto the op scan form. Second, the test administration date at which the subject passed that basic skill test was also coded using the same TAD coding as previously noted (LATAD, MTAD, AND RTAD, dates 1-5 and 9). For those subjects that did not successfully pass at 70% or above on any given basic skill area test, the most recent score for each basic skill area test was recorded and a 9 was coded as TAD to indicate that the requirement for that test was not met. The possibility existed that some subjects required more than one test administration to reach 70% or better on each basic skill area test. By identifying at which TAD by basic skill area the subjects met or did not meet the mastery level, the opportunity existed to make discrete comparisons of the subjects by basic skill areas or test administration dates.

The data on the completed 300 op scan forms was transferred onto magnetic tape and a print-out of frequency distributions on each variable and individual case was requested. This procedure permitted an overall view of the data and the opportunity to check for accuracy of coding. Errors in hand-coding were corrected and an accurate and complete tape of the data was finally generated.

Summary

Chapter 3 has focused on the design of the study and descriptions of the setting, the subjects, and the data collection procedures. Chapter 4 will describe the data analysis procedures, the descriptive characteristics of the subjects in the investigation and the results of the data analysis procedures in light of the research questions posed in Chapter 1.

CHAPTER 4

DATA ANALYSIS AND RESULTS

This chapter contains a report of the way the data was analyzed and the results of the analysis. A discussion of the results of the descriptive analysis of the data will be followed by a discussion of the results of the inferential analysis of the data for each of the research questions posed in Chapter 1.

Descriptive Analysis

The data was analyzed to determine the frequency of distribution, means and standard deviations of each variable for the entire group of subjects. The normative variables under consideration in this study were sex, race, age and ability test scores. Of the 300 subjects in this study, 143 were male and 157 were female. After the recoding of the variable race, as reported in Chapter 3, the data analysis identified 199 of the subjects as white and 101 of the subjects as minorities. The ages of the subjects ranged from 17 years 3 months to 20 years old, with a mean age of 17 years 8 months. The Short Test of Educational Ability (STEA) scores for the subjects ranged from 67 to 145 with a mean STEA score of 98.3 and a standard deviation of 15.95.

The STEA quotient is a grade-based standard score with a standard deviation of 16 and a mean at grade 12 of 109. In interpreting

STEA quotient scores, the reader should recognize the fact that students are being compared with students at their grade level, rather than age level. For the majority of students, this will make little difference in the obtained quotients. The differences in traditional IQ and STEA quotient may be significant, however, for the student whose age is two or more years older than expected for grade placement. For these students, one should expect a significantly higher STEA quotient than would have been obtained using traditional procedures, because the STEA quotient provides for grade-based rather than age-based comparisons. For the student whose age is typical for grade placement, the STEA quotient will approximate the IQ obtained by traditional procedures. For the group of subjects included in this investigation to whom the STEA was administered by the district during grade 10, the normed STEA quotient mean was 104.2 and the normed standard deviation was 16.39 (SRA, 1972).

The performance variables under consideration in this study were grade point average (G.P.A.), course of study, absenteeism and truancy. The G.P.A. of the subjects on a 4-point scale ranged from .31 to 4.00 with a mean of 2.04 and a standard deviation of .75. The total days absent from 4 years of high school for the subjects ranged from zero days absent to 189 days absent, with a mean of 51.15 days and a standard deviation of 36.41. The total days truant from 4 years of high school for the subjects ranged from zero days to 80 days, with a mean of 15.85 days and a standard deviation of 13.13.

It was previously noted that the district under investigation had multiple secondary attendance centers. Additional descriptive analysis of the data yielded a breakdown of the distribution of subjects by the variables of race and sex across high schools. These results are displayed on table 4.

There were more whites females in the sample than any other group, and more white subjects in the sample than minority subjects. Manual High School had the highest number of minority subjects (40), while Richwoods High School had the largest number of white subjects. The smallest difference in number between white subjects and minority subjects (45 white subjects and 40 minority subjects) occurred at Manual High School. Conversely, Richwoods High School had the largest

TABLE 4

Distribution of Sample by Race and Sex Across High Schools

	Manual High School n	Peoria High School n	Woodruff High School n	Richwoods High School n	Total n
Race/Sex					
white males	21	26	16	36	99
white females	24	33	15	28	100
minority males	15	16	7	6	44
minority females	25	20	4	8	57
Total	85	95	42	78	300

number of white subjects. The smallest difference in number between white subjects and minority subjects (45 white subjects and 40 minority subjects) occurred at Manual High School. Conversely, Richwoods High School had the largest difference in number between white subjects and minority subjects (64 white subjects and 14 minority subjects).

Table 5 indicates the distribution of the subjects in this investigation by course of study across high schools. Manual High School had the largest number of subjects enrolled in the Business/Commercial course of study and the smallest number of subjects enrolled in the College Preparatory course of study. At Peoria High School, there were the same number of subjects enrolled in the College Preparatory course of study as in the General Education course of study, with the largest group of subjects enrolled in the Special Programs course of study. The number of subjects enrolled in the Business/Commercial course of study at Woodruff High School equaled the number of subjects enrolled in the Special Programs course of study. The College Preparatory course of study represented the largest enrollment of subjects at Richwoods High School, with the number of subjects enrolled in the General Education course of study equal to the number of subjects enrolled in the Trades/Technical course of study.

Across high schools, the largest number of subjects were enrolled in the Special Program course of study. This was followed by enrollment in Business/Commercial, College Preparatory, General Education, and Trades/Technical courses of study, respectively.

TABLE 5

Distribution of Sample by Course of Study Across High Schools

	Manual High School n	Peoria High School n	Woodruff High School n	Richwoods High School n	Total n
General Education	16	19	6	10	51
Business/Commercial	29	15	10	18	72
College Preparatory	5	19	9	27	60
Special Programs	25	35	10	13	83
Trades/Technical	10	7	7	10	34
Total	85	95	42	78	300

Table 6 illustrates the mean grade point average (G.P.A.), age, ability test scores (STEA), truancies, absences, and MCT basic skill area scores across high schools. The overall mean for the variables listed and MCT scores was also calculated and is displayed on table 6.

For the sample, Woodruff High School and Richwoods High School demonstrated higher mean G.P.A.s and ability test scores. Subjects from Peora High School were older at graduation on the average (18 years/1 month of age), while the mean ages of subjects from the other three high schools were closer to the mean age for the total group.

The Language Arts MCT consisted of 75 items and the mean of the subjects was 75.45%. The Mathematics MCT consisted of 81 items and the mean of the subjects across high schools was 75.72%. The mean

TABLE 6

The Calculated Subject Means for G.P.A., Age, STEA, Truancy, Absenteeism, and Basic Skill Area MCTs across High Schools

	Manual High School $\bar{x}$	Peoria High School $\bar{x}$	Woodruff High School $\bar{x}$	Richwoods High School $\bar{x}$	Group $\bar{x}$
G.P.A.	1.87	1.97	2.10	2.33	2.04
Age (years/months)	17/09	18/01	17/07	17/07	17/08
STEA	93.36	96.68	99.29	105.59	98.73
Truancy	18.41	17.60	15.04	12.36	15.85
Absenteeism	58.21	57.19	49.01	39.06	51.15
MCT Basic Skill Area Scores[a]					
Language Arts	71.12	71.29	78.82	83.44	75.45
Mathematics	71.17	70.78	81.16	83.79	75.72
Reading	79.90	79.97	85.18	88.66	82.93

[a] MCT basic skill area scores are expressed in percents

of the subjects across high schools on the 81-item Reading MCT was 82.93%.

Subjects from Richwoods High School demonstrated the highest mean scores across all three basic skill area MCTs. The mean MCT scores for Reading at Manual High School were similar to the mean MCT scores in Mathematics for subjects from Peoria High School. Across all high schools, the Reading MCT mean scores were higher than the mean scores for the other basic skill areas, with the group mean reflecting this trend as well.

The mean basic skill area MCT scores, for the sample, expressed in percents by course of study are displayed on table 7. Across all basic skill area MCTs, subjects enrolled in the College Preparatory course of study demonstrated the highest mean scores, while subjects enrolled in the Special Programs course of study demonstrated the lowest mean scores. Across all basic skill area MCTs, the mean MCT scores for subjects enrolled in the General Education course of study were closest to the group means.

TABLE 7

Mean Basic Skill Area MCT Scores by Course of Study[a]
(n=300)

Basic Skill Area	General Education n	Business/ Commercial n	College Prep n	Special Programs n	Trades/ Technical n	GROUP n
Language Arts	74.29	79.20	88.64	63.92	74.16	75.45
Mathematics	74.27	79.12	89.33	62.95	77.92	75.73
Reading	81.94	85.49	92.80	73.41	84.89	82.94

[a] MCT basic skill area scores are expressed in percents

In the district under investigation, graduation requirements included the completion of all three basic skill area MCTs, as noted in Chapter 1. Table 8 indicates the number of subjects who completed each basic skill area MCT on designated test administration dates by course of study.

TABLE 8

Subjects' Completion of Basic Skill Area MCTs by Test Administration Date and Course of Study

Test Adminstration Date	Basic Skill Area	General Education n	Business Commercial n	College Prep n	Special Programs n	Trades Technical n	Total n
1	Language Arts	21	42	52	20	10	145
	Mathematics	15	32	50	13	18	128
	Reading	34	58	59	36	30	217
2	Language Arts	9	15	6	14	11	55
	Mathematics	8	10	6	6	9	39
	Reading	3	11	1	6	2	29
3	Language Arts	3	4	0	8	4	19
	Mathematics	6	7	2	10	5	30
	Reading	5	1	0	3	1	10
4	Language Arts	3	3	1	6	4	17
	Mathematics	5	10	0	12	9	36
	Reading	2	0	0	4	0	6
5	Language Arts	1	1	0	2	0	4
	Mathematics	2	5	1	7	0	15
	Reading	0	0	0	0	0	0

A majority of subjects across all courses of study completed the individual basic skill area MCT requirements on the first test administration date. The largest number of subjects completed the Reading MCT requirement on the first test administration date, with the subjects enrolled in the College Preparatory course of study representing the largest sub-group.

The Mathematics MCT requirement was met by the smallest number of subjects on TAD 1, again with the largest number of subjects within that group representing the College Preparatory course of study. The number of subjects representing the Business and Commercial, Trades and Technical, General Education, and Special Programs courses of study respectively reflected a decreasing group size of those subjects who were able to complete the Mathematics MCT requirement on test administration date one.

Subjects enrolled in the College Preparatory and Business/Commercial courses of study represented the two largest groups of subjects who completed the Reading MCT requirement on TAD 1. As with the other basic skill areas, a majority of subjects completed this MCT requirement on the first test administration date.

On the second test administration date, the group of subjects enrolled in the Business/Commercial course of study represented the largest number of subjects who completed the MCT requirements across all basic skill areas (36 Ss). This was followed by groups of subjects enrolled in the Trades/Technical, General Education, Special Programs, and College Preparatory courses of study, respectively.

By the fifth test administration date, the number of subjects completing the MCT requirement across all basic skill areas and courses of study had dropped considerably.

Table 9 reflects the distribution of subjects by course of study who did not complete the MCT graduation requirement by basic skill area.

TABLE 9

Number of Subjects Who Did Not Meet Basic Skill Area MCT Requirements by Course of Study and Basic Skill Area

	General Education n	Business/ Commercial n	College Preparatory n	Special Programs n	Trades Technical n	Total n
Language Arts	14	8	1	5	32	60
Mathematics	15	8	1	4	35	52
Reading	7	2	0	1	28	38

Subjects from each course of study across basic skill areas may actually be represented more than once as it was possible to have met the requirement for two basic skill area MCTs and not have met the MCT requirement for the third basic skill area MCT. Across course of study, the basic skill area on which the largest number of subjects did not meet the criterion score of at least 70% was Language Arts. This was followed by the basic skill areas of Mathematics and Reading, respectively.

Inferential Analysis

After descriptive analysis of the data was completed, several inferential statistical analyses were applied to the data to answer the research questions pursued in this investigation. This section of the chapter contains the data analysis techniques applied to the sample data for each of the research questions.

Two additional recoding procedures were applied to the data to facilitate accurate inferential analysis. The sample sizes of the subjects who completed the MCT graduation requirements on test administration dates 2 and 5 were insufficient to permit accurate inferential analysis for each separate test administration date. The test administration date categories were therefore collapsed using a recoding procedure which clustered the subjects into three groups based upon the test administration date at which the MCT requirement was met. These categories were: test administration date (TAD 1), test adminstration date 2 (test administration dates 2 through 5= TAD 2), and test administration date 9 (the category which included those subjects who did not complete the MCT requirements for high school graduation=TAD 9).

In addition, to facilitate data analysis on the multiple regression analysis, a final recoding procedure was executed on the performance variable course of study. The variable course of study was recoded in terms of dummy coding procedures which would allow its use in multiple regression procedures (Draper and Smith, 1956). A set of dummy variables is created by treating each category of a nominal variable as a separate variable and counting all of the cases in each category. The dummy variables therefore take on metric values and may be included in the regression equation. When recoding variables into dummy variables it is necessary to exclude one of the dummies from the equation because the n^{th} dummy variable is completely determined by the n-1 dummies entered into the regression equation. The excluded category becomes a reference category by which the effects of the other categories are interpreted. (Nie, et al, 1975).

The variable course of study was recoded with the course of study Trades/Technical arbitrarily identified as the reference category. Therefore, the Trades/Technical course of study is not represented on the accompanying tables nor in the predictor equations. For cases belonging to the Trades/Technical course of study, the predicted Y score would be:

$$Y^1 = A + b_2 X b_2 + b_3 X b_3 + b_n X_n \ldots$$

where:

Y^1 = the predicted score

A = the intercept (constant)

b_2 = the partial regression coefficient for variable X_2

X_2 = the predictor variable

b_3 = the partial regression coefficient for variable X_3

X_3 = the predictor variable

After the dummy coding procedures were completed, inferential statistical analyses were applied to the data to investigate the research questions as follows:

Research Question 1: What is the order of influence of the normative variables and the performance variables on district-wide MCT scores on designated test administration dates?

A multiple regression analysis was the statistical test used to analyze the influence of the variables when each basic skill area MCT was used as a criterion variable on the three categories on test administration dates. Table 10 shows a summary of the statistically significant variables resulting from a multiple regression analysis for the basic skill area MCT of Language Arts for TAD 1. This table includes the Multiple R, the R square, the B, the Beta and the F. In this table, the B represents the unstandardized partial regression coefficient, the Beta represents the standardized partial regression coefficient, and the F represents the test for significance.

The variable course of study was stepped into the equation first and followed by the remaining variables. For the criterion variable Language Arts MCT on TAD 1, the predictor variables course of study, G.P.A., and race were found to be statistically significant predictors ($F_{cv} = 3.51$, $p < .01$). Course of study and G.P.A. accounted for 36.39% of the variance in predicting district-wide Language Arts MCT scores for those subjects who completed that basic skill area MCT on TAD 1. When the third variable, race, was stepped in, a slight increase in predictibility of variance in Language Arts MCT performance was provided (2.696%).

The summary of predictor variables stepped into a multiple regression equation for predicting district-wide Mathematics MCT scores is displayed on table 11. This table includes the Multiple R, the R square, the B, the Beta, and the F. The variables course of study and G.P.A. accounted for 46.56% of the variance in predicting district-wide Mathematics MCT scores on TAD 1 and were statistically significant predictors at the $p<.01$ level. The addition of the variable STEA modestly increased the predictibility (3.59%) and this variable was a statistically significant predictor at the $p<.01$ level.

The multiple regression analysis for the criterion variable of district-wide Reading MCT scores on TAD 1 yielded statistically significant results as displayed on table 12. Course of study and G.P.A. accounted for 24.28% of the variance in predicting Reading MCT scores district-wide.

As previously noted, the categories of test administration dates 2 through 5 were collapsed so as to provide a sufficient amount of data to analyze in a multiple regression. This collapsed category of test administration dates 2 through 5 was labeled TAD 2. The procedure of stepping in course of study first was followed in a manner similar to the multiple regression procedure for TAD 1. For the criterion variable Language Arts MCT on TAD 2, course of study, STEA and race were found to be statistically significant predictors ($F_{cv}=3.47$, $p<.01$). Course of study, STEA and race accounted for 16.14% of the variance in predicting Language Arts scores for TAD 2. Course of study was statistically significant at the $p<.01$ level; the variables

TABLE 10

Summary Table--Step-wise Multiple Regression for Language Arts MCT on Test Administration Date 1[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.31158	0.09708	-0.618990	-0.02268	
General Education	0.31354	0.09831	5.793680	0.24982	
Business/Commercial	0.38151	0.14555	4.445965	0.26327	
College Preparatory	0.50071	0.25072	7.098439	0.46447	
Course of Study Composite					8.44880**
GPA	0.60324	0.36390	4.133699	0.37782	17.365**
Race	0.62518	0.39086	-4.521114	-0.16566	4.381**

Regression Equation for Predicting Language Arts MCT scores on Test Administration Date 1:

$\widehat{\text{Language Arts}}$= -0.619 (Special Programs) + 5.79 (General Education) + 4.45 (Business/Commercial)
+7.10 (College Preparatory + 4.13 (G.P.A.) -4.52 (Race) + 71.4128

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* $p<.05$
** $p<.01$
[a] presented is a summary table of statistically significant results

TABLE 11

Summary Table--Step-wise Multiple Regression for Mathematics MCT on Test Administration Date 1[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.21484	0.04615	-7.111026	-0.24866	
General Education	0.24787	0.06144	-5.560409	-0.22881	
Business/Commercial	0.46782	0.21886	-6.447230	-0.36434	
College Preparatory	0.48080	0.23116	-3.123013	-0.19502	
Course of Study Composite					7.59189**
GPA	0.68232	0.46557	5.393525	0.47046	28.374**
STEA	0.70816	0.50149	0.1253114	0.21967	7.134**

Regression Equation for Predicting Mathematics MCT scores on Test Administration Date 1:

$$\widehat{\text{Mathematics}} = -7.11\ (\text{Special Programs}) - 5.56\ (\text{General Education}) - 6.45\ (\text{Business/Commercial}) - 3.12\ (\text{College Preparatory}) + 5.39\ (\text{G.P.A.}) + .13\ (\text{STEA}) + 63.23154$$

* $p < .05$
** $p < .01$
[a] presented is a summary of statistically significant results

STEA and race demonstrated statistical significance in the multiple regression analysis at the $p < .05$ level, as indicated on table 13.

The variable STEA appeared to be significant in the prediction of Language Arts MCT scores for TAD 2. This variable did not demonstrate statistical significance for predicting Language Arts MCT scores for TAD 1. Rather, for TAD 1, G.P.A. was statistically significant after course of study had been controlled for in the multiple regression. Similar to the results of the multiple regression analysis for TAD 1, however, the analysis for TAD 2 yielded the variable race as a statistically significant predictor of Language Arts MCT scores. Within the variable course of study, the regression coefficient for College Preparatory course of study was largest in relative magnitude. The coefficients for Special Programs and General Education courses of study were similar in value. Unlike the regression coefficient for the variable race in the predictor equation for Language Arts MCT for TAD 1 which carried a negative weight in the equation, the variable race in the prediction equation of Language Arts on TAD 2 carried a positive weight.

Table 14 indicates the results of the multiple regression analysis when Mathematics MCT score for TAD 2 was used as the criterion variable. The variable course of study was stepped in first as a control. This variable was determined not to be statistically significant in predicting Mathematics MCT scores for TAD 2. However, the variable race did demonstrate statistical significance

TABLE 12

Summary Table--Step-wise Multiple Regression for Reading MCT on Test Administration Date 1[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.15572	0.02425	-2.776212	-0.16244	
General Education	0.19462	0.03788	-2.614658	-0.18003	
Business/Commercial	0.34408	0.11839	-2.478111	-0.23432	
College Preparatory	0.35747	0.12779	-0.715777	-0.07479	
Course of Study Composite					3.69930*
GPA	0.49273	0.24279	2.681581	0.39138	15.187**

Regression Equation for Predicting Reading MCT scores on TAD 1:

$\widehat{\text{Reading}}$ = -2.78 (Special Programs) -2.61 (General Education) -2.48 (Business/Commericial) -0.72 (College Preparatory) + 2.68 (G.P.A.) + 86.75426**

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* $p < .05$
** $p < .01$
[a] presented is a summary table of statistically significant results

TABLE 13

Summary Table--Step-wise Multiple Regression for Language Arts MCT on Test Administration Date 2[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.11269	0.01270	0.6196220	0.06118	
General Education	0.14412	0.02077	0.6956592	0.05721	
Business/Commercial	0.14425	0.02081	1.481539	0.14032	
College Preparatory	0.32164	0.10345	4.554136	0.27316	
Course of Study Composite					3.60595**
STEA	0.36305	0.13180	.082748	0.19120	4.931*
Race	0.40179	0.16144	1.674836	0.17874	4.347*

Regression Equation for Predicting Lanaguage Arts MCT scores on TAD 2:

$$\widehat{\text{Language Arts}} = .620\ (\text{Special Programs}) + .70\ (\text{General Education}) + 1.48\ (\text{Business/Commercial}) + 4.55\ (\text{College Preparatory}) + .083\ (\text{STEA}) + 1.67\ (\text{Race}) + 67.69754$$

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* $p<.05$

** $p<.01$

[a] Test Administration Date 2 in the Regression Analysis consisted of the collapsed categories of test administration dates 2 through 5; presented is a summary table of statistically significant results.

as a predictor of Mathematics MCT scores. The statistical significance of race was at the $p < .05$ level, and that variable was the only variable that demonstrated statistical significance in predicting Mathematics MCT scores for TAD 2 when course of study was controlled for. A second regression analysis using only the variable race yielded a regression coefficient of -1.87 and a constant of 80.11351 and a multiple R of .15513. The results of the second regression analysis of the statistically significant predictor race are displayed in the regression equation on table 14.

Table 15 illustrates the statistically significant variables in the multiple regression analysis for Reading MCT scores on TAD 2. Course of study did not demonstrate statistical significance as a predictor variable; however, when course of study was controlled for through the step-wise regression, the variables STEA and race were found to be statistically significant predictors of Reading MCT scores for TAD 2.

A second regression analysis using only the statistically significant predictors STEA and race yielded regression coefficients of .17 and -2.77, respectively. The results of the second regression analysis of the statistically significant predictors STEA and race are displayed in the regression equation on table 15.

In addition to analyzing the data for TADs 1 and 2, a category of test administration date was created that consisted of all subjects who failed to meet the MCT graduation requirements prior to high school graduation. This category was labeled test administration

TABLE 14

Summary Table--Step-wise Multiple Regression for Mathematics MCT on Test Administration Date 2[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.19260	0.03710	-1.867504	-0.14537	
General Education	0.19322	0.03733	0.423013	0.02707	
Business/Commercial	0.19594	0.03839	1.039375	0.07661	
College Preparatory	0.22209	0.04932	3.169481	0.14794	
Course of Study Composite					1.62130
Race	0.15513	0.02407	-1.867977	-0.15513	3.15642*

Regression Equation for Predicting Mathematics MCT scores on TAD 2 for statistically significant predictors[b]:

$\widehat{\text{Mathematics}}$ = -1.87 (race) +80.11351

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* $p < .05$

** $p < .01$

[a] Test Administration Date 2 in the Regression Analysis consisted of the collapsed categories of test administration dates 2 through 5; presented is a summary table of statisically significant results.

[b] regression coefficeint determined through second multiple regression analysis of statistically significant predictors

TABLE 15

Summary Table--Step-wise Multiple Regression for Reading MCT on Test Administration Date 2[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.06118	0.00374	-1.043098	-0.97731	
General Education	0.12127	0.01471	-1.994745	-0.12311	
Business/Commercial	0.20641	0.04260	-0.745460	-0.05298	
College Preparatory	0.23579	0.05560	2.536565	0.11417	
Course of Study Composite					1.83976
STEA	0.31839	0.10137	0.174912	0.30329	13.698**
Race	0.38796	0.15051	-2.774299	-0.22218	7.346**

Regression Equation for Predicting Reading MCT scores on TAD 2 for statistically significant predictors[b]:

$\widehat{\text{Reading}} = .17\ (\text{STEA}) - 2.77\ (\text{race}) + 68.32048$

---

* $p < .05$

** $p < .01$

[a] Test Administration Date 2 in the Regression Analysis consisted of the collapsed categories of test administration dates 2 through 5; presented is a summary table of statistically significant results.

[b] regression coefficient determined through second multiple regression analysis of statistically significant predictors

date 9 (TAD 9) and a multiple regression analysis was the statistical test used to analyze the influence of the variables when each basic skill area MCT was used as the criterion variable on this test administration date category. Table 16 illustrates the results of the multiple regression analysis for the criterion variable of Language Arts MCT scores for TAD 9.

The variables course of study, G.P.A., race and age were found to be statistically significant predictors ($F_{cv} = 2.52$, $p < .05$) for the criterion variable of Language Arts MCT scores for TAD 9. Course of study was found to account for 19.51% of the variance in predicting Language Arts MCT scores. When the variables G.P.A., race, and age were stepped in, the predictibility in MCT variance increased to 45.82%. These results reveal the variable age as a statistically significant predictor for the first time.

The variables which demonstrated statistical significance as predictors of Mathematics MCT scores for TAD 9 are displayed in table 17. After course of study was stepped in, the variable of age was found to add to the predictibility. These two variables accounted for 33.96% of the variance in predicting Mathematics MCT scores for TAD 9. As with the predictor equation for Language Arts MCT scores on TAD 9, age appears for the first time as a statistically significant predictor for Mathematics MCT scores across all test administration dates.

For the criterion variable of Reading MCT scores on TAD 9, the variables which demonstrated statistically significance as predictors are shown on table 18. Course of study, age, race and G.P.A. were

TABLE 16

Summary Table--Step-wise Multiple Regression for Language Arts MCT on Test Administration Date 9[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.43956	0.19321	-6.909803	-0.22101	
General Education	0.43999	0.19359	2.794364	0.07606	
Business/Commercial	0.44012	0.19371	4.318484	0.09176	
College Preparatory	0.44169	0.19509	15.35151	0.12233	
Course of Study Composite					3.57502*
GPA	0.57014	0.32506	-11.89803	-0.38190	12.357**
Race	0.61609	0.37957	-9.540482	-0.30409	8.869**
Age	0.67688	0.45816	-7.100375	-0.29469	8.123**

Regression Equation for Predicting Language Arts MCT scores on TAD 9:

Language Arts = -6.910 (Special Programs) + 2.79 (General Education) +4.32 (Business/Commercial) +15.35 (College Preparatory) -11.90 (G.P.A.) -9.54 (Race) -7.10 (Age) + 207.6827

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* $p<.05$

** $p<.01$

[a] Test Administration Date 9 is the created category which includes all subjects who failed to meet the MCT graduation requirements prior to high school graduation; presented is a summary of the statistically significant results.

TABLE 17

Summary Table--Step-wise Multiple Regression for Mathematics MCT on Test Administration Date 9[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.48388	0.23414	-17.19036	-0.51512	
General Education	0.49006	0.24016	- 2.514977	-0.06413	
Business/Commercial	0.49039	0.24048	- 1.226489	-0.02442	
College Preparatory	0.49530	0.24532	16.12353	0.12037	
Course of Study Composite					4.79472**
Age	0.58278	0.33963	- 8.036881	-0.31250	8.283**

Regression Equation for Predicting Mathematics MCT scores on TAD 9:

$$\widehat{\text{Mathematics}} = -17.19\ (\text{Special Programs}) - 2.51\ (\text{General Education}) - 1.23\ (\text{Business/Commercial}) + 16.12\ (\text{College Preparatory}) - 8.04\ (\text{race}) + 205.7975$$

---

* $p < .05$

** $p < .01$

[a] Test Administration Date 9 is the created category which includes all subjects who failed to meet the MCT graduation requirements prior to high school graduation; presented is a summary of statistically significant results.

TABLE 18

Summary Table--Step-wise Multiple Regression for Reading MCT on Test Administration Date 9[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.53144	0.28243	-15.09818	-0.47728	
General Education	0.53953	0.29109	- 1.48091	0.03984	
Business/Commercial	0.53968	0.29125	1.03060	0.02176	
College Preparatory	0.54044	0.29207	16.52271	0.13013	
Course of Study Composite					6.08544**
Age	0.64548	0.41664	- 9.84249	-0.40374	17.469**
Race	0.70008	0.49124	- 9.39809	-0.29607	9.437**
GPA	0.72600	0.52708	- 6.591262	-0.20910	4.244**

Regression Equation for Predicting Reading MCT scores on TAD 9:

$\widehat{\text{Reading}}$ = -15.10 (Special Programs) -1.48 (General Education) +1.03 (Business/Commercial) +16.52 (College Preparatory) -9.84 (Age) -9.40 (Race) -6.59 (G.P.A.) +269.5023 found to be statistically significant predictors of Reading MCT scores on TAD 9.

---

* $p<.05$

** $p<.01$

[a] Test Administration Date 9 is the created category which includes all subjects who failed to meet the MCT graduation requirements prior to high school graduation; presented is a summary of the statistically significant results.

Although the same variables were statistically significant as predictors for Language Arts MCT scores on TAD 9, when the criterion variable was Reading MCT scores on TAD 9, these predictor variables appeared in a different order. In addition to a difference in the relative magnitude of these predictor variables from Language Arts MCT score prediction to Reading MCT score prediction, there was also an increase in accounting for variance from 45.82% for Language Arts MCT scores to 52.71% for Reading MCT scores.

> Research Question 2: What is the order of influence of the normative variables and the performance variables on MCT scores by high school?

A multiple regression analysis was the statistical test used to analyze the influence of the variables for each of the four high schools when the basic skill area MCT was used as a criterion variable. The results of the data analysis will be discussed by high school for the basic skill area MCTs. The regression equations for predicting basic skill area MCT scores for each high school and the designated level of significance are displayed on the accompanying tables.

For Manual High School, table 19 illustrates the variables which demonstrated statistical significance as predictors of Language Arts MCT scores. These variables were course of study, STEA, sex and race (F_{cv}=3.65, $p < .01$). The variable course of study was stepped into the regression analysis first and found to account for 13.27% of the variance in predicting Language Arts MCT scores. When the

TABLE 19

Summary Table--Step-wise Multiple Regression for Language Arts MCT for Manual High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.29717	0.08831	-14.24779	-0.40919	
General Education	0.35977	0.12943	- 8.148517	-0.19720	
Business/Commercial	0.36056	0.13200	- 6.712885	-0.19703	
College Preparatory	0.36433	0.13274	- 5.189135	-0.07559	
Course of Study Composite					3.06106*
STEA	0.49100	0.24108	0.399634	0.29629	7.795**
Sex	0.54765	0.29992	10.028790	0.30510	7.857**
Race	0.58339	0.34034	- 6.948879	-0.21473	4.719*

Regression Equation for Predicting Language Arts MCT Scores for Manual High School:

$\widehat{\text{Language}}$ Arts = -14.25 (Special Programs) -8.15 (General Education) -6.713 (Business/Commercial) -5.19 (College Preparatory) +0.40 (STEA) + 10.03 (Sex) -6.95 (Race) + 39.53500 other statistically significant predictor variables were considered, the predictibility of variance in scores was increased to 34.03%.

---

* $p<.05$
** $p<.01$
[a] presented is a summary of the statistically significant results.

Table 20 indicates the variables that were statistically significant predictors of Mathematics MCT scores for Manual High School. The variables course of study, G.P.A., sex and STEA accounted for 35.55% of the variance in predicting Mathematics MCT scores. All courses of study carried negative values (B) in the regression equation, although the course of study special programs appear to detract to a greater degree from the Mathematics MCT score for Manual High School than other courses of study. The regression equation for predicting Mathematics MCT scores for Manual High School at the $p < .05$ level is reported on table 20.

The regression equation for predicting Reading MCT scores for Manaual High School at the $p < .05$ level of significance is reported on table 21. This equation shows the variables that were found to be statistically significant predictors of Reading MCT scores. Course of study and race were found to be statistically significant predictors ($F_{cv}=3.65$, $p < .05$). Race and all courses of study except College Preparatory carried negative values in the regression equation. The variables course of study and race accounted for 31.08% of the variance in predicting Reading MCT scores.

In review then, at Manual High School, the statistically significant predictors for Language Arts MCT scores were course of study, STEA, sex and race. For Mathematics MCT scores, the

TABLE 20

Summary Table--Step-wise Multiple Regression for Mathematics MCT for Manual High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.32338	0.10457	-19.50087	-0.51461	
General Education	0.37639	0.14167	- 9.66077	-0.21871	
Business/Commercial	0.37649	0.14174	-10.37375	-0.18484	
College Preparatory	0.38032	0.14464	- 8.23706	0.27404	
Course of Study Composite					3.382*
G.P.A.	0.50408	0.25410	8.237967	0.27404	7.289*
Sex	0.55459	0.30757	9.850634	0.28035	6.838*
STEA	0.59621	0.35546	0.360618	0.25012	5.722*

Regression Equation for Predicting Mathematics MCT Scores for Manual High School:

$\widehat{\text{Mathematics}}$ = -19.50 (Special Programs) -9.66 (General Education) -10.37 (Business/Commercial) -8.24 (College Preparatory) +8.24 (G.P.A.) + 9.85 (Sex) + 0.36 (STEA) + 27.90265

---

* $p < .05$

** $p < .01$

[a] presented is a summary of the statistically significant results.

TABLE 21

Summary Table--Step-wise Multiple Regression for Reading MCT for Manual High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.34414	0.11843	-12.06386	-0.39344	
General Education	0.39414	0.15535	- 4.836710	-0.13533	
Business/Commercial	0.40153	0.16122	- 0.567071	-0.01924	
College Preparatory	0.41095	0.16888	6.172995	0.10396	
Course of Study Composite					4.06386*
Race	0.55746	0.31076	-10.66852	-0.38114	16.262**

Regression Equation for Predicting Reading MCT Scores for Manual High School:

$\widehat{\text{Reading}}$ = -12.06 (Special Programs) -4.84 (General Education) -0.57 (Business/Commercial)
+6.17 (College Preparatory) -10.67 (Race) + 89.20640

---

* $p < .05$
** $p < .01$
[a] presented is a summary of the statistically significant results

statistically significant predictors were course of study, G.P.A., sex and STEA; and for Reading MCT scores, course of study and race were found to be statistically significant predictors.

At Peoria High School, the variables found to be statistically significant predictors of Language Arts MCT scores are displayed on table 22. Course of study, age and STEA were found to be statistically significant predictors and accounted for 55.29% of the variance in predicting MCT scores. Course of study Special Programs and age carried negative weights in the predictor equation for Peoria High School on the criterion variable of Language Arts MCT scores ($F_{cv}=3.51$, $p < .01$).

Course of study, age and G.P.A. were found to be statistically significant predictors of Mathematics MCT scores for Peoria High School as illustrated on table 23. These variables accounted for 49.85% of the variance in predicting scores. In addition, the variable Special Programs course of study and age carried negative weights in the predictor equation for Mathematics MCT scores as they did for the predictor equation for Language Arts MCT scores.

Table 24 illustrates the results of the multiple regression analysis for the criterion variable of Reading MCT scores at Peoria High School. Course of study, age and G.P.A. demonstrated statistical significance as predictors ($F_{cv}=3.51$, $p < .01$) and accounted for 51.09% of the variance in predicting Reading MCT scores. As with the criterion variables of Language Arts MCT scores and Mathematics MCT

TABLE 22

Summary Table--Step-wise Multiple Regression for Language Arts MCT for Peoria High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.50299	0.25300	-4.172356	-0.11435	
General Education	0.53852	0.29000	5.983618	0.13599	
Business/Commercial	0.54915	0.30156	9.710960	0.20119	
College Preparatory	0.61955	10.38384	15.239190	0.34634	
Course of Study Composite					14.01637**
Age	0.71793	0.51543	-8.699655	-0.31479	17.312**
STEA	0.74355	0.55287	0.276481	0.24774	7.369**

Regression Equation for Predicting Language Arts MCT Scores for Peoria High School:

$$\widehat{\text{Language Arts}} = -4.17\ (\text{Special Programs}) + 5.98\ (\text{General Education}) + 9.71\ (\text{Business/Commercial}) + 15.24\ (\text{College Preparatory}) - 8.70\ (\text{Age}) + 0.28\ (\text{STEA}) + 196.0520$$

---

* $p < .05$

** $p < .01$

[a] presented is a summary of the statistically significant results.

TABLE 23

Summary Table--Step-wise Multiple Regression for Mathematics MCT for Peoria High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.50114	0.25114	-6.784037	-0.16468	
General Education	0.51948	0.26986	5.863796	0.11804	
Business/Commercial	0.52903	0.27988	8.616748	0.15812	
College Preparatory	0.57809	0.33419	11.71085	0.23574	
Course of Study Composite					11.29331**
Age	0.67081	0.44998	-10.40062	-0.33333	18.6111**
G.P.A.	0.70607	0.49854	6.577390	0.27253	8.521**

Regression Equation for Predicting Mathematics MCT Scores for Peoria High School:

$$\widehat{\text{Mathematics}} = -6.78\ (\text{Special Programs}) + 5.86\ (\text{General Education}) + 8.62\ (\text{Business/Commercial}) + 11.71\ (\text{College Preparatory}) - 10.40\ (\text{Age}) + 6.58\ (\text{G.P.A.}) + 241.5964$$

---

* $p < .05$

** $p < .01$

[a] presented is a summary of the statistically significant results.

TABLE 24

Summary Table--Step-wise Multiple Regressing for Reading MCT for Peoria High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.53436	0.28554	-10.03282	-0.33196	
General Education	0.55257	0.30533	0.66470	0.01824	
Business/Commercial	0.56480	0.31899	2.07934	0.05201	
College Preparatory	0.58564	0.34298	4.89710	0.13436	
Course of Study Composite					11.74541**
Age	0.69576	0.48408	- 8.54151	-0.37312	23.906**
G.P.A.	0.71474	0.51085	3.58301	0.20235	4.816*

Regression Equation for Predicting Reading MCT Scores for Peoria High School:

$\widehat{\text{Reading}}$ = -10.03 (Special Programs) +0.66 (General Education) +2.08 (Business/Commercial) +4.90 (College Preparatory) -8.54 (Age) +3.58 (G.P.A.) + 228.0434 scores, on the criterion variable of Reading MCT scores, the predictor variables of Special Programs course of study and race contributed negative weights to the predictor equation.

---

* $p < .05$

** $p < .01$

[a] presented is a summary of the statistically significant results.

In review, for Peoria High School, the statistically significant predictor variables for Language Arts MCT scores were course of study, age and STEA. Course of study, age and G.P.A. were found to be statistically significant predictors for the criterion variables of Mathematics MCT scores and Reading MCT scores.

The data on each basic skill area MCT for Woodruff High School was also analyzed using a multiple regression analysis that yielded the information on tables 25 through 27. For the criterion variable of Language Arts MCT scores, course of study, race and age were statistically significant predictors ($F_{cv} = 3.89$, $p < .01$). These variables accounted for 51.60% of the variance in predicting Language Arts MCT scores. In the regression equation indicated on table 25 the variables race, age, Special Programs course of study and General Education course of study carried negative weights. The College Preparatory course of study carried the highest positive value in the prediction equation.

Course of study and STEA were statistically signficant predictors of Mathematics MCT scores at Woodruff High School as indicated on table 26 ($F_{cv} = 3.89$, $p < .01$) and accounted for 44.58% of the variance in prediction. All courses of study except College Preparatory carried negative weights in the predictor equation; STEA carried

TABLE 25

Summary Table--Step-wise Multiple Regression for Language Arts MCT for Woodruff High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.53865	0.29014	-13.73641	-0.48501	
General Education	0.56050	0.31416	- 4.98150	-0.14451	
Business/Commercial	0.57009	0.32500	0.45096	0.01592	
College Preparatory	0.60906	0.37095	5.84277	0.19875	
Course of Study Composite					5.45479**
Race	0.68423	0.46817	- 8.27929	-0.30177	6.139**
Age	0.71831	0.51596	- 4.31307	-0.23436	3.456*

Regression Equation for Predicting Language Arts MCT Scores for Woodruff High School:

$$\widehat{\text{Language Arts}} = -13.74\,(\text{Special Programs}) -4.98\,(\text{General Education}) +0.45\,(\text{Business/Commercial}) +5.84\,(\text{College Preparatory}) -8.28\,(\text{Race}) -4.31\,(\text{Age}) + 160.8667$$

---

* $p < .05$

** $p < .01$

[a] presented is a summary of the statistically significant results.

TABLE 26

Summary Table--Step-wise Multiple Regression for Mathematics MCT for Woodruff High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.44829	0.20097	-10.90500	-0.36625	
General Education	0.52398	0.27455	- 8.02001	-0.22130	
Business/Commercial	0.55963	0.31318	- 1.55860	-0.05235	
College Preparatory	0.59611	0.35535	4.73999	0.15337	
Course of Study Composite					5.09877**
STEA	0.66770	0.44582	0.24200	0.33930	5.878**

Regression Equation for Predicting Mathematics MCT Scores for Woodruff High School:

$$\widehat{\text{Mathematics}} = -10.91\,(\text{Special Programs}) - 8.02\,(\text{General Education}) - 1.56\,(\text{Business/Commercial}) + 4.74\,(\text{College Preparatory}) + 0.24\,(\text{STEA}) + 60.23396$$

---

* $p < .05$

** $p < .01$

[a] presented is a summary of the statistically significant results.

TABLE 27

Summary Table--Step-wise Multiple Regression for Reading MCT for Woodruff High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.44914	0.20172	-9.810233	-0.41250	
General Education	0.46322	0.21458	-3.995358	-0.13802	
Business/Commercial	0.49224	0.24230	-1.208234	-0.05080	
College Preparatory	0.51960	0.26999	5.842559	0.23668	
Course of Study Composite					3.42099*
Race	0.59922	0.35907	-7.093744	-0.30791	5.004*

Regression Equation for Predicting Reading MCT Scores for Woodruff High School:

$\widehat{\text{Reading}}$ = -9.81 (Special Programs) -4.00 (General Education) -1.21 (Business/Commercial) +5.84 (College Preparatory) -7.09 (Race) + 88.97535 a small but positive weight in the equation for predicting Mathematics MCT scores at Woodruff High School.

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* $p < .05$

** $p < .01$

[a] presented is a summary of the statistically significant results.

The regression equation for predicting Reading MCT scores included the variables of course of study and race ($F_{cv} = 2.65$, $p < .05$). These variables accounted for 35.91% of the variance in predictibility. Race and all courses of study excluding College Preparatory carried negative weights in the prediction equation as illustrated on table 27.

In review, the statistically significant predictors for basic skill area MCT scores at Woodruff High School were course of study, race and age for Language Arts MCT; course of study and STEA for Mathematics MCT scores; and, course of study and race for Reading MCT scores. In each regression analysis, course of study was stepped-in first and then the other variables were evaluated for statistical significance in predicting MCT scores.

The data from Richwoods High School were analyzed to determine the order of influence of the variables in predicting basic skill area MCT scores. On Language Arts MCT scores, the variables which demonstrated statistical significance as predictors were course of study, STEA and age ($F_{cv} = 3.60$, $p < .01$). The variables accounted for 57.93% of the variance in predicting Language Arts MCT scores. In the predictor equation, the variables of age and special programs course of study carried negative weights, while other courses of study and STEA carried positive weights as illustrated on table 28. The weight in the predictor equation carried by the General Education

TABLE 28

Summary Table--Step-wise Multiple Regression for Language Arts MCT for Richwoods High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.45185	0.20417	-0.83565	-0.03085	
General Education	0.45715	0.20899	10.99938	0.36383	
Business/Commercial	0.47021	0.22109	7.843837	0.32698	
College Preparatory	0.66722	0.44518	11.45750	0.53930	
Course of Study Composite					14.64342**
STEA	0.73819	0.54493	0.19731	0.31695	10.860**
Age	0.76109	0.57926	-3.54601	-0.19441	5.793*

Regression Equation for Predicting Language Arts MCT Scores for Richwoods High School:

$\widehat{\text{Language Arts}}$ = -0.84 (Special Programs) +11.00 (General Education) +7.84 (Business/Commercial) +11.46 (College Preparatory) +0.20 (STEA) -3.55 (Age) + 119.1118 course of study was very similar to the weight in the predictor equation carried by the College Preparatory course of study.

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* $p < .05$
** $p < .01$
[a] presented is a summary of the statistically significant results.

Table 29 illustrates the results of the multiple regression for predicting Mathematics MCT scores for Richwoods High School. Course of study, STEA and absenteeism were statistically significant predictors ($F_{cv} = 3.56$, $p < .01$) and accounted for 48.81% of the variance in predicting Mathematics MCT scores. This analysis yielded absenteeism for the first time as a statistically significnat predictor of a basic skill area MCT score, and in this case, the variable absenteeism carried a negative value in the predictor equation. All course of study except College Preparatory carried negative weights in the predictor equation, and STEA carried a small but positive weight in the equation.

The variables that were found to be statistically significant predictors of Reading MCT scores for Richwoods High School are displayed on table 30. Course of study, STEA, age and race were found to account for 58.16% of the variance in predicting Reading MCT scores. Contrary to the weights in the other predictor equations for Richwoods High School, all courses of study except Special Programs carried positive values for the criterion variable of Reading MCT scores. STEA carried a small but positive weight in the predictor equation, while the substantial negative weight of race was counterbalanced when the course of study entered into the equation was College Preparatory.

In summary for Richwoods High School, the statistically significant predictors for the basic skill area MCT of Language Arts were course of study, STEA and age. For the basic skill area MCT of Mathematics, the

TABLE 29

Summary Table--Step-wise Multiple Regression for Mathematics MCT for Richwoods High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.47523	0.22584	-9.087557	-0.29527	
General Education	0.47856	0.22902	-0.629517	-0.01835	
Business/Commercial	0.52502	0.27564	-3.474413	0.06744	
College Preparatory	0.56381	0.31789	1.625945	0.06744	
Course of Study Composite					8.50508**
STEA	0.67102	0.45026	0.223241	0.31598	7.541**
Absenteeism	0.69864	0.48809	-0.335649	-0.24119	5.246**

Regression Equation for Predicting Mathematics MCT Scores for Richwoods High School:

$\widehat{\text{Mathematics}}$ = -9.09 (Special Programs) -0.63 (General Education) -3.47 (Business/Commercial)
+1.63 (College Preparatory) +0.22 (STEA) -0.34 (Absenteeism) + 64.87905

* $p<.05$
** $p<.01$
[a] presented is a summary of the statistically significant results.

TABLE 30

Summary Table--Step-wise Multiple Regression for Reading MCT for Richwoods High School[a]

Variables	Multiple R	R Square	B	Beta	F
Course of Study					
Special Programs	0.35246	0.12433	-1.542101	-0.07057	
General Education	0.38805	0.15058	0.698014	0.02866	
Business/Commercial	0.40276	0.16222	4.931376	0.25513	
College Preparatory	0.51477	0.26499	5.000709	0.29214	
Course of Study Composite					6.57945**
STEA	0.67174	0.45123	0.159119	0.31722	9.474**
Age	0.72643	0.52770	-4.313396	-0.29350	13.088**
Race	0.76263	0.58161	-5.476899	-0.25809	9.019**

Regression Equation for Predicting Reading MCT Scores for Richwoods High School:

$\widehat{\text{Reading}}$ = -1.54 (Special Programs) + 0.70 (General Education) +4.93 (Business/Commercial) +5.00 (College Preparatory) +0.16 (STEA) -4.31 (Race) + 147.4315 statistically signficant predictors were course of study, STEA and absenteeism; and for the basic skill area MCT of Reading, the statistically significant predictors were course of study, STEA, age and race. Unlike the predictor variables of the other high schools, G.P.A. was not found to be a statistically significant predictor for any of the basic skill area MCTs at Richwoods High School.

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* $p < .05$
** $p < .01$
[a] presented is a summary of the statistically significant results.

Research Question 3: Is there a significant differences in MCT scores among individual high schools?

An analysis of variance (ANOVA) was used to compare the mean scores on each basic skill area MCT by high school. When significant differences were indicated by the overall F test, a Fisher's LSD (least significant differnce) follow-up test was used to determine which pairs were significant. The LSD follow-up test indicated pairs of group means whose differences were statistically significant and revealed a pattern of significance that was identical for all high schools across all basic skill area MCTs. These patterns of significance are displayed by the analysis of variance summary tables for basic skill area MCTs (tables 31, 33, and 35) and by the LSD summary tables which accompany the analysis of variance summary tables (tables 32, 34 and 36).

When the mean MCT scores across all basic skill areas for the high schools were compared, there was a statistically significant difference between the mean MCT scores from Manual High School and the mean MCT scores from Woodruff High School and Richwoods High School. In

TABLE 31

Analysis of Variance Summary Table for Language Arts MCTs by High Schools

	Source	df	SS	MS	F
Language Arts	Between Groups	3	8704.24	2901.41	
	Within Groups	296	65682.99	221.90	13.075**
	Total	299	74387.19		

* $p<.05$
** $p<.01$

TABLE 32

Summary Table of LSD Follow-up Test for Language Arts MCTs

	N	Mean	SD	Fisher's LSD***
(1) Manual High School	85	71.12	16.25	1 with 2 1 with 3*** 1 with 4*** 2 with 3*** 2 with 4*** 3 with 4
(2) Peoria High School	95	71.29	17.69	
(3) Woodruff High School	42	78.82	12.21	
(4) Richwoods High School	78	83.44	10.17	
TOTALS	300	74.45	15.77	

***denotes pairs of groups significantly different at the $p<.05$ level

TABLE 33

Analysis of Variance Summary Table for Mathematics MCTs by High Schools

	Source	df	SS	MS	F
Mathematics	Between Groups	3	10403.76	3467.92	
	Within Groups	296	79866.96	269.82	12.853**
	Total	299	90270.69		

* $p < .05$
** $p < .01$

TABLE 34

Summary Table of LSD Follow-up Test for Mathematics MCTs

	N	Mean	SD	Fisher's LSD***
(1) Manual High School	85	70.78	17.37	1 with 2 1 with 3*** 1 with 4*** 2 with 3*** 2 with 4*** 3 with 4
(2) Peoria High School	95	71.17	19.98	
(3) Woodruff High School	42	81.16	12.84	
(4) Richwoods High School	78	83.79	11.54	
TOTALS	300	75.73	17.38	

***denotes pairs of groups signficantly different at the $p < .05$ level

TABLE 35

Analysis of Variance Summary Table for Reading MCTs by High Schools

	Source	df	SS	MS	F
Reading	Between Groups	3	4386.75	1462.25	
	Within Groups	296	46263.60	156.30	9.356**
	Total	299	50650.34		

* $p < .05$
** $p < .01$

TABLE 36

Summary Table of LSD Follow-up Test for Reading MCTs

	N	Mean	SD	Fisher's LSD***
(1) Manual High School	85	79.90	14.05	1 with 2 1 with 3*** 1 with 4*** 2 with 3*** 2 with 4*** 3 with 4
(2) Peoria High School	95	79.97	14.66	
(3) Woodruff High School	42	85.18	10.25	
(4) Richwoods High School	78	88.66	8.20	
TOTALS	300	82.94	13.01	

***denotes pairs of groups significantly different at the $p < .05$ level addition, there was a statistically significant difference in mean MCT scores across all basic skill areas for Peoria High School as compared to Woodruff High School and Richwoods High School.

Research Question 4: Is there a significant difference in district-wide MCT scores among the three basic skill areas?

The statistic used to analyze the differences of district-wide means between each of the three basic skill area MCTs was the t-test for dependent or correlated samples. The critical value of the t-distribution two-tailed test at the .01 level of significance is 2.326.

The means of the basic skill area MCTs were compared in pairs: Language Arts and Mathematics, Lanaguage Arts and Reading, and Mathematics and Reading. The results of the analysis are displayed on table 37.

The differences in district means for the Language Arts and the Mathematics basic skill area MCTs as represented by the sample were not statistically significant. However, a statistically significant difference was demonstrated in comparing the district-wide means of the Language Arts and Reading MCTs as represented by the sample and the Reading and Mathematics MCTs as represented by the sample.

Research Question 5: Is there a significant difference in MCT scores among the three basic skill areas by high school?

The statistic used to analyze the difference of district-wide MCT means and individual high school means between each of the basic skill areas was a t-test for dependent or correlated samples. The critical value for the t-distribution two-tailed test at the .01

TABLE 37

t-Test for District-Wide Basic Skill Area MCTs by Pairs

MCT Basic Skill Area	M	SD	t (df=299)
Language Arts	75.45	15.77	-.54
Mathematics	75.73	17.38	
Language Arts	75.45	15.77	-14.82**
Reading	82.94	13.02	
Mathematics	75.73	17.38	-11.98**
Reading	82.94	13.02	

* $p < .05$
**$p < .01$

level of significance was 2.326.

The means of the basic skill areas were compared in pairs for each high school: Language Arts and Mathematics, Language Arts and Reading, and Reading and Mathematics. The results of the analysis are displayed on table 38.

When the results of the t-test were reviewed, a pattern of significant differences were evident. The differences between district MCT means in Language Arts and Mathematics and individual high school MCT means in Language Arts and Mathematics were not statistically significant. The differences between district means in Language Arts and Reading and individual high school MCT means in Language Arts and Reading were statistically significant as were

TABLE 38

t-Test for Differences in Means by Pairs for District-wide MCT Scores and Individual High School MCT scores

High School	MCT Basic Skill Area	M	SD	t
Manual	Language Arts	71.12	16.25	(df=84)
	Mathematics	71.17	17.37	-0.05
	Language Arts	71.12	16.25	-8.21**
	Reading	79.90	14.05	
	Reading	79.90	16.25	-7.21**
	Mathematics	71.17	17.37	
Peoria	Language Arts	71.29	17.69	(df=94)
	Mathematics	70.78	19.98	0.53
	Language Arts	71.29	17.69	-8.88**
	Reading	79.97	14.66	
	Reading	79.97	14.66	-7.57**
	Mathematics	70.78	19.98	
Woodruff	Language Arts	78.82	12.21	(df=41)
	Mathematics	81.16	12.84	-1.84
	Language Arts	83.44	10.17	-5.37**
	Reading	85.18	10.25	
	Reading	88.66	10.17	-5.12**
	Mathematics	83.79	11.54	

TABLE 38 (Continued)

High School	MCT Basic Skill Area	M	SD	t
Richwoods	Language Arts	83.44	10.17	(df=77)
	Mathematics	83.79	11.54	-0.41
	Language Arts	83.44	10.17	-7.36**
	Reading	88.66	8.20	
	Reading	88.66	10.17	-5.12**
	Mathematics	83.79	11.54	

* $p < .05$
** $p < .01$

the differences between district means in Reading and Mathematics and individual high school MCT means in Reading and Mathematics.

Summary

This chapter reported the data analysis procedures and the results of the descriptive and the inferential analyses. Statistically significant results from the inferential analysis procedures were discussed for each of the research questions posed in Chapter 1. Chapter 5 will focus on a discussion of the implications of the results. Possible effects on curriculum, instruction, remediation, and supervision will be presented as suggestions will be made for further research.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

MCT has been an educational phenomenon in American public education for over a decade, with the issues raised regarding MCT not yet fully resolved. This study investigated the relationship between normative variables, performance variables and high school MCT scores in a large public school system that had an MCT program. The results of this study are generalizable only to the district under investigation. However, the results of this study may prompt educators to consider the relationship of student characteristics and MCT performance in other school districts. The suggestions, recommendations and cautions in this chapter are based upon the data analysis reported in Chapter 4. The research questions posed in Chapter 1 will serve as organizers for discussing the implications of this study for curriculum, instruction, remediation and supervision. Where appropriate, recommendations for further research will be suggested.

> Research Question 1: What is the order of influence of the normative variables and the performance variables on district-wide MCT scores on designated test administration dates?

To clarify the discussion on this research question, tables 39, 40 and 41 indicate a summary of the predictor equations for each basic skill area MCT by designated test administration dates. These tables also indicate the multiple Rs and the levels of significance, the mean MCT scores and the standard deviations for each course of study.

Table 39

Summary Table of Predictor Equations, Multiple Rs, Means, and Standard Deviations for Language Arts MCT Scores by Test Administration Dates

	Language Arts MCT Predictor Equation	Multiple R	$\bar{X}$	SD
Test Administration Date 1	$\hat{LA}$=-0.62(Special Programs)+4.13)G.P.A.)-4.52(race)+71.4128	.31158**	79.56	7.86
	5.79(General Education)	.31354**	87.35	6.69
	4.45(Business and Commercial)	.38151**	85.68	5.60
	7.10(College Preparatory)	.50071**	90.77	7.24
	(Trades and Technical)[a]		79.78	6.22
Test Administration Date 2[b]	$\hat{LA}$= .62(Special Programs)+.08(STEA)+1.67(race)+67.69754	.11269*	76.41	4.24
	.70(General Education)	.14412*	76.70	4.02
	1.48(Business and Commercial)	.14425*	77.88	5.32
	4.55(College Preparatory)	.32164*	81.58	4.21
	(Trades and Technical)		76.00	4.02
Test Administration Date 9[c]	$\hat{LA}$=-6.91(Special Programs)-11.90(G.P.A.)-9.54(race)-7.10(age)+207.6827	.43956*	45.98	15.76
	2.79(General Education)	.43999*	59.29	11.93
	4.32(Business and Commercial)	.44012*	60.50	12.42
	15.35(College Preparatory)	.44169*	64.00	0.00
	(Trades and Technical)		58.93	15.47

* $p < .05$

**$p < .01$

[a] The absence of a partial regression coefficient is due to the use of the Trades and Technical course of study as the reference category in the data analysis.

[b] Test Administration Date 2 consisted of the collapsed category of test administration dates 2 through 5.

[c] Test Administration Date 9 was the created category which included all subjects who failed to meet the MCT graduation requirements prior to high school graduation.

Table 40

Summary Table of Predictor Equations, Multiple Rs, Means, and Standard Deviations for Mathematics MCT Scores by Test Administration Dates

	Mathematics MCT Predictor Equation	Multiple R	$\bar{x}$	SD
Test Administration Date 1	$\hat{M}=$ -7.11(Special Programs)+5.39(G.P.A.)+.13(STEA)+63.32154	.21484**	81.76	5.51
	-5.56(General Education)	.24787**	85.27	7.55
	-6.45(Business and Commercial)	.46782**	83.54	8.00
	-3.12(College Preparatory)	.48080**	91.39	7.03
	(Trades and Technical)[a]		87.45	3.74
Test Administration Date 2[b]	$\hat{M}=$ -1.87(race)+80.11351	.15513*		
Test Administration Date 9[c]	$\hat{M}=$ -17.19(Special Programs)-8.04(race)+205.7975	.48388**	41.84	15.30
	-2.52(General Education)	.49006**	56.13	11.28
	-1.23(Business and Commercial)	.49039**	59.41	10.93
	16.12(College Preparatory)	.49530**	69.14	0.00
	(Trades and Technical)		59.01	26.26

* $p < .05$

**$p < .01$

[a] The absence of a partial regression coefficient is due to the use of the Trades and Technical course of study as the reference category in the data analysis.

[b] Test Administration Date 2 consisted of the collapsed category of test administration dates 2 through 5.

[c] Test Administration Date 9 was the created category which included all subjects who failed to meet the MCT graduation requirements prior to high school graduation.

Table 41

Summary Table of Predictor Equations, Multiple Rs, Means, and Standard Deviations for Reading MCT Scores by Test Administration Dates

	Reading MCT Predictor Equation	Multiple R	$\bar{X}$	SD
Test Administration Date 1	$\hat{R}$= -2.78(Special Programs)+5.39(G.P.A.)+86.75426	.15572**	89.99	5.47
	-2.61(General Education)	.19462**	91.17	5.20
	-2.48(Business and Commercial)	.34408**	90.84	5.84
	-0.72(College Preparatory)	.35747**	94.24	3.29
	(Trades and Technical)[a]		92.18	2.78
Test Administration Date 2[b]	$\hat{R}$= 0.17(STEA)-2.77(race)+68.32048	.31839*		
		.38796*		
Test Administration Date 9[c]	$\hat{R}$=-15.10(Special Programs)-9.84(age)-9.49(race)-6.59(G.P.A.)+269.5023	.53144*	58.63	16.50
	-1.48(General Education)	.53953*	73.33	8.70
	1.03(Business and Commercial)	.53968*	77.31	9.00
	16.52(College Preparatory)	.54044*	81.48	0.00
	(Trades and Technical)		77.53	9.38

* $p < .05$

** $p < .01$

[a] The absence of a partial regression coefficient is due to the use of the Trades and Technical course of study as the reference category in the data analysis.

[b] Test Administration Date 2 consisted of the collapsed category of test administration dates 2 through 5.

[c] Test Administration Date 9 was the created category which included all subjects who failed to meet the MCT graduation requirements prior to high school graduation.

Since performance variables are those over which schools and students have some control, they hold the most promise for curricular, instructional, and supervisory recommendations. Course of study and G.P.A. were the only performance variables which were statistically significant predictors across all basic skill area MCTs for the designated test administration dates. Several observations are necessary in light of the data presented.

For TAD 1, the College Preparatory course of study demonstrated a positive weight in the equation for predicting Language Arts MCT scores. Enrollment in the College Preparatory course of study may contribute to Language Arts MCT scores in a variety of ways. The College Preparatory course of study has been found to engage the students in activities which promote academic performance, including creative writing, higher order thinking and more frequent opportunities for discussion. These activities might be expected to promote the acquisition of Language Arts competencies, as evidenced by a higher mean Language Arts MCT score for the subjects enrolled in the College Preparatory course of study.

However, if the College Preparatory course of study promotes academic performance, then this course of study should have contributed positively in the Mathematics and Reading MCT predictor equations. This was not the case in this study. All courses of study, except Trades and Technical which was used as the reference category in the data analysis, carried negative weights in the predictor equations for Mathematics and Reading MCT scores.

These results may challenge the assumptions often held about the mathematical and reading comprehension superiority of the college preparatory students. The Alexander and McDill research (1976) suggested that college preparatory tracks may be more rigorous in academic expectations thereby positively influencing academic performance. However, in the district under investigation, this notion was not supported across all basic skill area MCTs. Specifically, the College Preparatory course of study did not appear to contribute to the extent anticipated to MCT scores in Mathematics and Reading. However, enrollment in the College Preparatory course of study detracted the least from MCT scores.

Enrollment in four of the courses of study carried a negative weight in the predictor equation for Reading MCT scores for those students who met the MCT graduation requirements on TAD 1. The relative weights of the Special Programs, General Education, and Business and Commercial courses of study indicated similiarities in the relationship of these courses of study and Reading MCT scores. These findings suggested two necessary points of clarification about the relationship between Reading MCT scores and course of study. First, course of study may in actuality not detract from Reading MCT scores. What these results may suggest is a disparity between the way reading competency is measured on the MCTs and the way in which reading competency is measured in the classroom. If this is the case, then efforts must be made to investigate the way in which competencies in reading are evaluated in the classroom and on the MCTs and efforts made to assure more consistency between these measures. The findings of the Rosenshine (1968) and Shutes (1969) studies may hold particular promise for investigating the extent to which materials that was required to answer post-test questions was covered in the class lessons. A sound linkage between instruction and evaluation must be made to assure that students are able to demonstrate competency in any of the basic skill areas.

Second, an examination of the MCT mean scores and standard deviations by course of study reveals information about the heterogeneity of the groups. The standard deviations for the mean MCT scores suggest a more heterogeneous group of subjects was enrolled in the Special Programs, General Education, and Business and Commercial courses of study than was enrolled in the College Preparatory course of study. The same comparison may be supported for the group of subjects enrolled in the College Preparatory course of study and the group of subjects enrolled in the Trades and Technical course of study. On the surface, it might appear that, by the lack of a partial regression coefficient for the Trades and Technical course of study in the predictor equation, that enrollment in the Trades and Technical course of study contributed more to MCT scores than enrollment in the College Preparatory course of study. This assumption is not supported by a comparison of the mean MCT scores and standard deviations for College Preparatory and Trades and Technical courses of study. Across all basic skill areas, the mean MCT scores for the subjects enrolled in the College Preparatory course of study were higher than for the subjects enrolled in the Trades and Technical course of study. However, the negative weights of the College Preparatory course of study may be partially explained by the standard deviations. The differences in standard deviations between these courses of study may lead to the suggestion that the College Preparatory course of study was represented in this study by a more heterogeneous group. This would contribute to the low but negative magnitude of the College Preparatory course of study in the predictor equation.

In addition to the heterogeneity of the subject group contributing to the negative weight of a course of study in a predictor equation, this negative weight may imply a low degree of curricular congruence. Sound curricular congruence requires a planned "match" between what is taught and what is tested. Although the MCTs cannot be used as a backdrop for judging educational programs as a whole, the MCTs can be used as part of a feedback loop to indicate whether skills that have been identified as important are being taught. If, as the results of this study suggest, the skills that are being taught and evaluated in the classroom may be different than the skills being evaluated on the MCTs, the necessary relationship between curriculum, instruction and evaluation may be weak.

Although course of study may appear to detract from MCT scores, the appearance of the variable G.P.A. in the predictor equations may offset the negative weights of course of study, particularly that of the College Preparatory course of study. G.P.A. may be considered another measure of the competency of students to demonstrate language arts, mathematical, and reading skills in the classroom. If indeed there is a close tie between the instruction in the classroom and the measure of classroom evaluation as indicated by G.P.A.s, then the Sherman and Hoffman research (1979) is supported. Clearly, a continuing measure of achievement such as G.P.A. can be a more stable predictor of academic success than a momentary measure of achievement such as a standardized test. In addition, the Alexander and McDill (1976) research indicated that higher G.P.A.s existed across academic curriculum tracks. These findings suggest that the negative weight of the College Preparatory course of study would be offset somewhat by expected higher G.P.A.s.

For students enrolled in the Trades and Technical course of study in the district, the variable G.P.A. in the predictor equation is of particular interest. As previously mentioned, the course of study Trades and Technical was used as a reference category in the data analyses. The relative magnitude of the partial regression coefficients for the other four courses of study in any one of the predictor equations reflected the inclusion of the Trades and Technical course of study in the statistical analyses. Therefore, the Trades and Technical course of study is not reflected in any predictor equation by a partial regression coefficient. Rather, as mentioned in Chapter 4, the predicted MCT scores for students enrolled in this course of study may be calculated using the other statistically significant variables and the constant.

If enrollment in the Trades and Technical course of study neither enhanced nor detracted from MCT scores, then the other variables in the predictor equation become even more relevant. The subjects in this study enrolled in the Trades and Technical course of study demonstrated a mean Language Arts MCT score that was lower than the group mean for Language Arts. The performance variables that were statistically significant predictors of Language Arts MCT scores, then, bear close examination for those students enrolled in the Trades and Technical course of study.

The statistically significant performance variable appearing in the predictor equation for district-wide Language Arts MCT scores across all TADs was G.P.A. By high schools, no performance variable other than course of study appeared as a statistically significant predictor for Language Arts MCT scores for subjects enrolled in the Trades and Technical course of study. Teachers and supervisors should recognize that G.P.A. is the only performance variable that is relevant for students enrolled in the Trades and Technical course of study. For these students, then, G.P.A. should be a particularly precise indicator of achievement in language arts competencies. As previously suggested, a close relationship should exist for students enrolled in any course of study between G.P.A. as a continuous measure of achievement and MCT scores as a momentary measure of achievement. Future research should focus on the relationship between these measures of achievement for language arts competencies for the students enrolled in the Trades and Technical course of study. If a weak or unsupported relationship exists, curricular and instructional modifications should be undertaken to strengthen the effectiveness of both measures to indicate student competency in language arts skills. This effort becomes paramount for the student enrolled in the Trades and Technical course of study at any high school.

The variable race was a significant predictor of Language Arts MCT scores for TAD 1. Although race is a variable over which the schools or the students have little control, its addition to the predictor equation assisted in developing a more complete picture of the student whose combination of normative and performance variables may influence MCT scores. In the data collection and data analysis procedures, the race category "white" carried a value of zero and the race category of "minority" carried a value of 1. In the predictor equations for

Language Arts MCT scores on TADs 1, 2, and 9 and Mathematics MCT scores on TADs 2 and 9, there is the suggestion that a relationship existed between being a minority and MCT scores. These findings supported the Cresswell and Houston research (1980) which had indicated race was a significant contributor to variance in mathematics achievement. The presence of race in the predictor equation for Reading MCT scores also verified the Golladay study (1978) which indicated that black children scored 10-20 percentage points below national averages on tests of reading and mathematics.

The combinations of these variables suggested that particular attention be paid to the minority student in the Business and Commercial course of study who has a relatively low G.P.A. This student would be more likely to have difficulty on the Language Arts MCTs. This becomes of particular importance in light of research that suggested that lower G.P.A.s existed across all non-academic tracks (Alexander and Eckland, 1974). Proactive efforts should be made by educators to assure sound linkages between instruction and evaluation. Supervisory personnel may wish to begin investigations into the unique learning characteristics of these students so as to tailor curriculum and/or remediation for these students.

Course of study was not found to be a statistically significant predictor for MCT scores for the basic skill areas of Mathematics and Reading on TAD 2. The absence of course of study in predicting Mathematics and Reading MCT scores for TAD 2 refutes the research by Gelb (1972) that suggested knowledge of curricular track placement assisted in explaining race and sex differences in achievement. Nor does the absence of course of study in these predictor equations support the research by Alexander and McDill (1976) which suggested that curriculum placement served to mediate the effects of status (home and background) variables. Rather, the normative variables of race and STEA were statistically significant as predictors of Mathematics and Reading MCT scores for TAD 2. Normative variables are those variables over which the schools or the students have little control, and these variables hold less potential for treatment by the schools. However, knowledge of the strength and order of these normative variables still contributes to the data base necessary for understanding the learning characteristics of particular groups of students. For example, research by Hare (1979) indicated that a difference existed between minority students and white students in achievement orientation and self-esteem. This information, coupled with the Alexander and McDill research (1976) holds some promise for curricular intervention. The Alexander and McDill study suggested a relationship existed between placement in a college preparatory curriculum track and degree of interpersonal relationships with others who held education important and conformed to the formal agenda of schooling. If this is the case, then future research should investigate the characteristics of courses of study which enhance positive attitudes towards education. Knowledge of these characteristics could assist curriculum planners in developing or modifying courses to include these characteristics, thus creating a learning environment adapted to the needs of a specific student population. In addition, supervisory personnel may focus on conducting teacher in-service programs which assist in the development of proficiency in instructional styles that promote student achievement motivation. These efforts would serve to lessen the effects of normative variables based upon knowledge of unique learning characteristics.

The absence of course of study in the predictor equations for Mathematics and Reading MCT scores for TAD 2 may be partially explained by an examination of the characteristics of the subjects on TAD 2. This test administration date was a collapsed category which consisted of all students who were successful in meeting the MCT graduation requirements on TADs 2 through 5. It had previously been established that students had the opportunity to take the MCTs as many times as they wished until they were successful. Repeated attempts on the MCTs may have resulted in a regression towards the mean phenomenon which served to over ride the effects of course of study. There may also have existed a diversity of normative characteristics between the TAD 2 student and the TAD 5 student which would have contributed to the lack of significance of course of study. Additionally, students in this collapsed category may also have taken advantage of optional remediation courses offered between TADs 3 and 4 and TADs 4 and 5. The effects of repeated efforts at taking the MCTs and the effects of the remediation course, if taken, cannot be judged by this study. However, knowledge of these conditions as possible contributors to the absence of course of study as a significant predictor may be an area for further research.

The predictor equations for TAD 9 indicated that the majority of variables carried negative weights in the equations. Of all the variables that demonstrated statistical significance as predictors of MCT scores, the variable G.P.A. bears serious examination.

In Chapter 2, the suggestion was made that subjects who were not successful on the MCTs for TAD 1 may have had a lapse of time between instruction in the basic types of skills the MCTs test and taking the MCTs. This lapse of time may have contributed to lower MCT scores, if indeed, the degree of proficiency in basic types of skills is proportionate to the degree to which these basic types of skills are reinforced through frequent use. If students had acquired basic skills early during high school coursework and were studying the more advanced skills of a content area at the time of taking the MCTs, an assumption may be supported that working familiarity with the more basic skills of a content area was low. This lapse of time between basic skill instruction and testing could be justified as an influence on MCT scores if the subjects were demonstrating achievement by another means, such as G.P.A. Indeed, the variable G.P.A. as a continuing measure of achievement has been supported as a more stable predictor of achievement than a momentary measure of achievement such as a test (Sherman and Hoffman, 1978). The G.P.A. should have provided feedback to the subjects on a consistent basis to indicate that they were achieving in an appropriate manner, and may have been the primary source of achievement information the subjects received. However, for Language Arts MCT scores and Reading MCT scores on TAD 9, the variable G.P.A. carried a negative weight in the predictor equation. This may be interpreted to mean the higher the G.P.A., the larger the negative influence on Language Arts and Reading MCT scores for those students who did not meet the MCT graduation requirement. This clearly represents a serious problem for the student population when success in academic achievement as measured by G.P.A. may, after a certain point in continued attempts on the MCTs, actually detract from success in meeting one criterion for high school graduation.

These results may indicate a mismatch between what is accepted as a measure of achievement in the classroom and what is accepted as a measure of achievement for high school graduation. Immediate research should be undertaken to investigate this disparity. The validity of the MCTs must be evaluated in relationship to what is taught and how achievement is encouraged in the classroom. If there existed a substantial disparity between curriculum and testing as this research implied, then efforts must be undertaken to bring the educational program and the testing program into a more compatible relationship.

In summary, for district-wide MCT scores, the performance variables course of study and G.P.A. and the normative variables race and age contributed significantly to MCT scores. Educators should examine the aspects of courses of study that contribute to MCT scores. Even for those courses of study that carried negative weights in the predictor equations, the relative magnitude of these weights indicated certain courses of study that enhanced MCT scores more than other courses of study. An examination of the relative importance of course of study to MCT scores can assist educators to develop curriculum and instruction patterns that capitalize on the best aspects of the courses of study which contribute to MCT scores. In addition, efforts must be made to assure that G.P.A. is indicative of the acquisition of competencies in these courses of study; competencies that are demonstrable on the MCTs. The variables race and age are helpful to educators in identifying the learning characteristics of minority and over-age-for-grade students to promote efforts to tailor instruction and remediation to meet their needs.

> Research Question 2: What is the order of influence of the normative variables and the performance variables on MCT scores by high school?

To clarify the discussion on this research question, tables 42, 43 and 44 indicate a summary of the predictor equations for each basic skill area MCT by high schools. These tables also indicate the multiple Rs and the levels of significance, the mean MCT scores and the standard devaiations for each course of study. Course of study appeared to be a significant predictor of MCT scores for all high schools across all basic skill area MCTs. Race, STEA, and age were also included in several of the predictor equations as they also demonstrated significance in the district-wide predictor equations. The variables sex and absenteeism appeared in several of the predictor equations for individual high school basic skill area MCT scores, whereas these variables did not demonstrate statistical significance as predictors for district-wide MCT scores.

The variable course of study carried negative weights in the predictor equation for Manual High School across all courses of study in the basic skill area MCTs of Language Arts and Mathematics. In predicting Reading MCT scores, all courses of study except College Preparatory and Trades and Technical carried negative weights. These results suggested some significant areas of concern for curriculum, instruction, and supervision. If course of study did not contribute positively to MCT scores, it may have been that there was not an appropriate link between what was taught in the courses of study and what was tested on the MCTs. Although the MCTs should not be used to judge the quality

Table 42

Summary Table of Predictor Equations, Multiple Rs, Means, and Standard Deviations for Language Arts MCT Scores by High Schools

	Language Arts MCT Predictor Equation	Multiple R	$\bar{X}$	SD
Manual High School	$\hat{LA}$= -14.25(Special Programs)+.40(STEA)+10.03(sex)-6.95(race)+39.53500	.29717*	63.68	21.56
	-8.15(General Education)	.35977*	67.75	15.65
	-6.71(Business and Commercial)	.36056*	76.95	11.49
	-5.19(College Preparatory)	.36433*	78.67	10.41
	(Trades and Technical)		74.40	5.54
Peoria High School	$\hat{LA}$= -4.17(Special Programs)-8.70(age)+.28(STEA)+196.0520	.50299**	59.70	18.88
	5.98(General Education)	.53852**	71.79	9.24
	9.71(Business and Commercial)	.54915**	77.16	10.63
	15.24(College Preparatory)	.61955**	88.99	8.13
	(Trades and Technical)		67.23	16.88
Woodruff High School	$\hat{LA}$= -13.74(Special Programs)-8.28(race)-4.32(age)+160.8667	.53865**	67.20	13.61
	-4.98(General Education)	.56050**	77.99	10.08
	0.45(Business and Commercial)	.57009**	81.47	7.81
	5.84(College Preparatory)	.60906**	88.44	10.51
	(Trades and Technical)		79.99	6.25
Richwoods High	$\hat{LA}$= -0.84(Special Programs)+.20(STEA)-3.55(age)+119.1118	.45185**	73.23	14.08
	11.00(General Education)	.45715**	87.29	5.96
	7.84(Business and Commercial)	.47021**	83.26	6.27
	11.46(College Preparatory)	.66722**	90.31	5.99
	(Trades and Technical)		74.67	3.87

* $p < .05$

** $p < .01$

[a] The absence of a partial regression coefficient is due to the use of the Trades and Technical course of study as the reference category in the data analysis.

Table 43

Summary Table of Predictor Equations, Multiple Rs, Means, and Standard Deviations for Mathematics MCT Scores by High Schools

	Mathematics MCT Predictor Equation	Multiple R	$\bar{X}$	SD
Manual High	$\hat{M}$= -19.50(Special Programs)+8.24(G.P.A.)+9.85(sex)+.36(STEA)+27.90265	.32338*	62.52	23.79
	-9.66(General Education)	.37639*	68.21	16.64
	-10.37(Business and Commercial)	.37649*	77.31	9.85
	-8.24(College Preparatory)	.38032*	80.01	13.17
	(Trades and Technical)[a]		75.31	7.61
Peoria High School	$\hat{M}$= -6.78(Special Programs)-10.40(age)+6.58(G.P.A.)+241.5964	.50114**	57.74	20.42
	5.86(General Education)	.51948**	73.36	13.21
	8.62(Business and Commercial)	.52903**	76.73	14.77
	11.11(College Preparatory)	.57809**	88.39	7.42
	(Trades and Technical)		68.43	24.56
Woodruff High School	$\hat{M}$= -10.91(Special Programs)+.24(STEA)+60.23396	.44829**	70.99	16.52
	-8.02(General Education)	.52398**	76.13	14.75
	-1.56(Business and Commercial)	.55963**	82.22	6.51
	4.74(College Preparatory)	.59611**	92.54	5.74
	(Trades and Technical)		83.95	5.24
Richwoods High School	$\hat{M}$= -9.09(Special Programs)+.22(STEA)-.34(absenteeism)+64.87905	.47523**	71.61	18.07
	-0.63(General Education)	.47856**	84.57	6.11
	-3.47(Business and Commercial)	.52502**	82.30	7.68
	1.63(College Preparatory)	.56381**	90.67	6.83
	(Trades and Technical		82.96	7.65

* $p < .05$

**$p < .01$

[a] The absence of a partial regression coefficient is due to the use of the Trades and Technical course of study as the reference category in the data analysis.

Table 44

Summary Table of Predictor Equations, Multiple Rs, Means, and Standard Deviations for Reading MCT Scores by High Schools

	Reading MCT Predictor Equation	Multiple R	$\bar{X}$	SD
Manual High School	$\hat{R}$= -12.06(Special Programs)-10.67(race)+89.20640	.34414*	72.45	20.97
	-4.84(General Education)	.39414*	77.70	9.49
	-0.57(Business and Commercial)	.40153*	83.86	7.37
	6.17(College Preparatory)	.41095*	91.11	6.67
	(Trades and Technical)[a]		84.94	4.50
Peoria High School	$\hat{R}$= -10.03(Special Programs)-8.54(race)+3.58(G.P.A.)+228.0434	.53436**	69.77	16.27
	0.66(General Education)	.55257**	82.13	9.65
	2.08(Business and Commercial)	.56480**	84.26	10.40
	4.90(College Preparatory)	.58564**	92.27	5.10
	(Trades and Technical)		82.54	10.07
Woodruff High School	$\hat{R}$= -9.81(Special Programs)-7.09(race)+88.97535	.44914*	77.04	13.70
	-4.00(General Education)	.46322*	84.98	11.22
	-1.21(Business and Commercial)	.49224*	85.64	6.37
	5.84(College Preparatory)	.51960*	92.45	3.73
	(Trades and Technical)		86.95	7.64
Richwoods High School	$\hat{R}$= -1.54(Special Programs)+.16(STEA)-4.31(race)+147.4315	.35246**	82.24	12.15
	0.70(General Education)	.38805**	86.55	6.54
	4.93(Business and Commercial)	.40276**	89.06	6.15
	5.00(College Preparatory)	.51477**	93.60	4.75
	(Trades and Technical)		85.06	6.80

* $p < .05$

**$p < .01$

[a] The absence of a partial regression coefficient is due to the use of the Trades and Technical course of study as the reference category in the data analysis.

of an educational program, the MCTs can provide feedback to identify groups of students for whom the match between curriculum in certain courses of study is not being met. The negative weights associated with the courses of study at Manual High School give rise to the concern that the necessary congruence between curriculum and evaluation is weak. Specifically, it appears that the weakest linkage between what was taught and what was tested occurred in the Special Programs course of study.

In addition, the variable race carried a significant negative value in the basic skill areas of Language Arts and Reading. These two factors are particularly important for evaluating curriculum, congruence of instruction and evaluation on the MCTs at Manual High School because the sample from Manual High School indicated the highest number of minority students across high schools and the highest number of students enrolled in the Special Programs course of study across high schools. Efforts must be made to assure that the curriculum the students in the Special Programs course of study receive is relevant, the instruction (delivery system) is appropriate to developing skills, a positive interaction relationship exists in the classroom between teacher and student; and, the evaluation of the skills closely parallels the learning objectives.

The variable sex appeared in the predictor equation for Manual High School for the basic skill area MCTs of Language Arts and Mathematics. The coding of the variable sex for data analysis assigned a zero value to males and a value of 1 to females. Therefore, the interpretation of these predictor equations indicated that females have an advantage on Language Arts and Mathematics MCTs. The distribution of subjects from Manual High School indicated that there were more females included in the study than males, and more minority females included than white females. The appearance of the variable sex at Manual High School in MCT predictor equations may be interpreted to support the Blattstein (1979) and Hare (1979) studies which indicated minority females scored higher on measures of academic achievement than black males, although lower than white females. Attempts should be made to develop curriculum and instruction which capitalizes on the academic orientation of black students, as previously suggested by the Hare findings.

The variable G.P.A. appeared only in the predictor equation for Mathematics MCT scores at Manual High School. Although much of the research supported G.P.A. as a reliable predictor of academic achievement, in the sample from Manual High School, the effects of G.P.A. as a predictor across all basic skill area MCTs may have been offset by the significant weights of course of study in the final equations.

By contract, at Peoria High School, across all basic skill area MCTs, the variable course of study appeared to enhance MCT scores to a greater degree than occurred at Manual High School. Again, however, the specific course of study Special Programs carried a negative weight in the predictor equation. This suggested that the Special Programs course of study may have had some inherent characteristics which did not enhance achievement on a standardized measure of competency.

The student in the Special Program course of study may have had a lower opportunity to learn because of the work-study released time element in this course of study. If a lower opportunity to learn did exist, then efforts must be made to assure that the opportunities to learn for the student provide an optimum environment for achievement.

In effect, the extent of content coverage and the appropriateness of evaluation measures may be more critical for the Special Programs student. Across all basic skill area MCTs, subjects enrolled in the Special Programs course of study demonstrated lower mean scores. Therefore, curriculum specialists and administrators should be vigilant in attempts to assure close linkages between curriculum and instruction. This effort was suggested by the Rosenshine (1968) and Shutes (1969) studies which indicated there were significant correlations between the extent to which material that was required to answer post-test questions was covered in class.

The Stallings, (1975, 1980) research provided some additional suggestions for supervisory personnel to consider for students with a lower opportunity to learn. The Stallings study suggested that the pattern of supportive interactions between secondary students and teachers influenced achievement gains. Clearly there should be efforts made by supervisors to assist teachers in increasing the degree of supportive interaction occurring the classroom. This may be accomplished through in-service, use of the clinical supervision model, or attempts to develop alternative teaching arrangements. In addition, Aspy and Roebuck (1977) suggested that there is a positive and significant relationship between a supervisor's level of supportive interpersonal function with teachers and the degree to which teachers employ those same interpersonal skills in the classroom. Responsible supervisors should evaluate the instructional styles of teachers as well as personal supervisory styles to increase the level of interpersonal support in these relationships.

When the variable course of study is compounded by the effects of the variable age, one could expect the over-age-for-grade student enrolled in the Special Programs course of study at Peoria High School to experience difficulties in MCT achievement. It should be noted that the mean age of the subjects from Peoria High School was higher than that of the other high schools and higher than the district mean. Implications for future investigations include examinations of retention procedures of the feeder shools to the high school and other procedures, policies or patterns of behavior that might contribute to students from Peoria High School being older than students from other high schools in the district. The results of understanding what contributed to this phenomenon at Peoria High School could assist in developing instruction designed for the characteristics unique to these students.

At Woodruff High School, a larger number of the specific courses of study carried negative weights in the predictor equations across basic skill area MCTs than at Peoria High School, with Special Programs carrying the highest negative weight across all basic skill areas. Again, the College Preparatory course of study carried the highest positive weight across all basic skill areas. If one assumed that the negative weight of course of study in a predictor equation implied a lower degree of compatibility between classroom instruction and the measurement of competencies on the MCTs, then it may follow that there was a greater disparity between instruction and evaluation in some courses of study at Woodruff High School than at Peoria High School.

Race again appeared as a statistically significant predictor for Language Arts and Reading MCT scores. This supported the Golladay (1978) study which indicated a relationship between race and achievement.

Although STEA was a statistically significant predictor for Mathematics MCT scores at Woodruff High School, this variable did not carry a substantial weight in the equation. Rather, course of study appeared to contribute more to Mathematics MCT scores. This may be due in part to the course of study mathematics requirements. Students in all but the College Preparatory course of study were required to take a minimum of 1 credit (1 year) in mathematics, with a wide range of courses from which to choose. By contrast, the College Preparatory course of study required 2 credits in mathematics and specified the courses that were acceptable. This may account for the positive weighting of College Preparatory course of study in the predictor equations for Mathematics MCT scores. If this is the case, then the number of mathematics courses required and the specificity of the courses across all courses of study should be examined.

The variable age in the predictor equation for Language Arts MCT scores carried a high negative value; yet the mean age for the subjects from Woodruff High School closely approximated the group mean. The interpretation of this finding may be made only in light of the variable race in the predictor equation. The research by Farley (1977) may be used to support investigations of differences in grade placements for balcks. Although the data in this study could not provide such information, based on Farley's suggestion that grade placement for blacks is a full 30% of a grade lower than for whites, it may be that the minority subjects in the sample from Woodruff were older-for-grade than the white subjects, thus accounting for an interaction between race and age in predicting Language Arts MCT scores.

At Richwoods High School age, STEA and course of study appear in the Language Arts MCT predictor equation. Interpretations of the effects of STEA must be viewed with two cautions: (1) the weight of STEA in the equation, although positive, may only marginally contribute to Language Arts MCT scores as evidenced by the relatively low magnitude of the partial regression coefficient; and, (2) as previously reported, the STEA does not maintain its reliability when the subject's age is more than two years above what is expected by grade. With the addition of age into the predictor equation, the influence of STEA may be even less than indicated. Richwoods High School subjects represented one of the lowest age means among the high schools, and a lower age mean than the group mean. Therefore, the student who is older may indeed be a prime candidate for proactive instruction to mediate the effects of age on MCT achievement.

The appearance of the variable race in the predictor equation for Reading MCT scores may provide information related to the HEW study (1978). The HEW study indicated that overall enrollment for blacks was lower in academic tracks than in non-acedemic tracks. At Richwoods High School there was a disproportionately low number of minority subjects in the sample and a disproportionately high number of subjects enrolled in the College Preparatory course of study. This suggested that the more rigorous challenges of a college preparatory course may not overcome the variable race. Future research should extend the Alexander and McDill (1976) research on those process or product variables which are unique to College Preparatory courses of study. Information of this type could assist in improving the products of other courses, particularly Special Programs.

Absenteeism appeared for the first time in any predictor equation for Richwoods High School for Mathematics MCT scores. This may have indicated the occurrence of a richness of instruction whereby absences do affect the product. If the quality of the instruction was high, regardless of other variables, then each class meeting could have contributed substantially to MCT achievement. This quality of instruction may have been due in part to the larger proportion of College Preparatory course of study subjects included in the study from Richwoods. This would account for more academically-oriented courses and higher achievement being represented in the sample from Richwoods in general. The absence of G.P.A. in the MCT predictor equations for Richwoods High School may have supported the Alexander and Eckland (1974) research. Implicit in their research was the suggestion that in schools with higher proportions of students in academic courses of study, higher G.P.A.s occur; therefore, the variable G.P.A. should not have been expected to be a statistically significant predictor of MCT scores for Richwoods High School.

In general, several observations should be made regarding the order of influence of performance and normative variables for basic skill area MCTs by high schools. The performance variable course of study appeared as a statistically significant predictor in every predictor equation across high schools and basic skill area MCT. The relative magnitude of course of study varied within as well as between schools. These differences could have been affected by weak linkages between curriculum and evaluation or by a greater emphasis in some schools or courses of study on higher order thinking skills. MCTs commonly evaluate competencies at the knowledge, comprehension or application level (Bloom, 1964). In courses of study where there is a greater emphasis on higher order thinking skills, a difference in the predictor equations of relative importance of each course of study might be expected. The consistency of statistical significance of course of study leads to questions to be answered by future researchers. These questions may prompt investigations of curricular links and evaluation measures, effects of time-on-task for courses of study which include work-study or co-op programs; or the process variables within the classroom that promote supportive interaction and enhance skill acquisition. In addition, an on-going systematic evaluation of the MCTs should be developed to assure the content validity of these tests. This evaluation should include a careful study of the MCTs to maintain validity for the population to whom they are administered and for the purposes intended.

In addition to curricular and instructional ramifications, the implications for supervision include the need for evaluation of those instructional patterns which contribute to skill acquisition. Once these instructional patterns have been identified, supervisors may focus on specific recommendations for staff training or the development of supervisory techniques to assist in the acquisition of those instructional skills which promote competencies in the desired content areas.

Research Question 3: Is there a significant difference in MCT scores among high schools?

Across all basic skill area MCTs, significant differences were found between the four high schools. These differences indicated that Manual High School and Peoria High School may have been more similiar than Woodruff High School and Richwoods High School. These results suggested that perhaps the districtu under investigation may have only two distinct high school populations rather than four. Data on the variables G.P.A., STEA, truancy, and absenteeism indicated more similiarities between Richwoods High School and Woodruff High School and between Manual High School and Peoria High School than among all four high schools.

At first glance, these results would seem to suggest that there were curriculum differences between the high schools. In the district under investigation, however, this may not be the case. The Peoria Public Schools adopted a CBE program in 1975 to assure consistency of curriculum among the schools in the district. A detailed curriculum guide was developed for each content area to assure consistency of developmental learner objectives, content emphasis, resources, and teaching suggestions. If, as the findings in this study suggested, significant differences existed between MCT scores for pairs of high schools, there may be influences other than differences in curriculum that accounted for these results. These influences may have included differences in instructional styles between the pairs of high schools, differences in the number of academic courses offered or the proportion of students enrolled in academic courses between the pairs of high schools, or the extent to which the teachers followed the curriculum guides. Other influences may have been the degree of classroom supportive interaction between students and teacher, pupil-teacher ratio, or resource allocation between the pairs of high schools. Recommendations for supervision based on the findings of this study include an examination of the degree to which the classroom teachers adhered to the curriculum guides. Future research should focus on those patterns of influences that were different or similiar for these pairs of high schools.

In general, there appears to be several areas which future researchers should investigate to attempt to account for the differences between pairs of high schools in the district under investigation. These investigations may be able to isolate those tangible differences that contributed to the similiarities and differences between the high schools. However, it must be realized that the limits of educational research may prohibit investigators from uncovering those intangible influences that contribute to making each high school unique. Therefore, care must be exercised to uncover the influences over which curriculum and instruction modifications may be effective so as to provide a consistency of educational programming to all students in the district without disrupting those characteristics which contribute to the uniqueness of each high school.

Research Question 4: Is there a significant difference in district-wide MCT scores among the three basic skill areas?

In the district under investigation, significant differences were found to exist between Language Arts MCT scores and Reading MCT scores. There were significant differences also found between Mathematics MCT scores and Reading MCT scores. Several observations may be made in an effort to interpret these differences.

The district-wide mean MCT score expressed in percent for Reading was 82.94. This was significantly higher than the district-wide mean MCT scores for Language Arts and Mathematics, 75.45 and 75.73 respectively. Descriptive data analyses also revealed that the largest number of subjects met the Reading MCT graduation requirements on TAD 1 and the fewest number of students failed to meet the Reading MCT graduation requirement on TAD 9.

The Reading MCT appeared to be the basic skill area test on which students were most successful. This prompts several questions to be asked:

1. Is the difficulty level of the Reading MCT equivalent to the difficulty level of the Language Arts and Mathematics MCTs?

2. Is reading competency a pre-requesite to achievement on other basic skill area MCTs?

3. What influences can explain the significant differences between Reading MCT scores and the other basic skill area MCT scores?

Although the answers to all of these questions are unavailable from this study, several observations may be made to assist in recommending the implications for curriculum and instruction. The results of the Reading MCT indicated that, by and large, subjects were achieving a satisfactory degree of reading competency through the educational program. This was illustrated by the mean Reading MCT score which was higher than the mean MCT scores for Language Arts and Mathematics. Further, the reading competencies of the subjects indicated more homogeneity of ability as evidenced by the lower range in Reading MCT scores than in Language Arts or Mathematics MCT scores. These results may support the notion that competency in reading was a pre-requisite to language arts and mathematics competencies; lower scores in the other basic skill area MCTs may not be attributable to low reading skills. Rather, the differences in language arts and mathematics scores may have been more of an indication that content-specific skills were required on the Language Arts MCT and the Mathematics MCT. Further interpretation leads to the suggestion that although the subjects in this study could read adequately as measured on the Reading MCT, their specific content skills in language arts and mathematics were less than addquate. Future investigations should focus on the relationship between course content and evaluation, specifically in the skill areas of language arts and mathematics.

In summary, several suggestions are evident for future investigations. These suggestions include research into the relationship between what and when specific skills were taught in the classroom and what and when specific skills were tested on the MCTs in the content areas of Language Arts and Mathematics. If indeed the mean reading competency level of the district was high as represented by the sample mean, then support exists for the notion that MCT scores may have been affected by the time lag between instruction in basic skills and testing. If a time lag exists which can be found to influence achievement on the MCTs, then the sequence of course offerings may need to be modified. In addition, if the subjects in this study were able to demonstrate acceptable competency in reading but less than successful competency in language arts and mathematics, future efforts must be made to strengthen the ties between curriculum and evaluation in these areas.

Research Question 5: Is there a significant difference in MCT scores among the three basic skill areas by high schools?

In the district under investigation, statistically significant differences were found to exist between Language Arts MCT scores and Reading MCT scores across all high schools. There were statistically significant differences also found between Mathematics MCT scores and Reading MCT scores across all high schools. This pattern of significant differences duplicated the district-wide patterns among the three basic skill area MCTs. In light of these similiarities, several implications of these results bear noting.

The discussion of research question 4 suggested that reading skill development for the district may have been more well-developed than language arts or mathematics skill development. As previously mentioned, the subjects in this study may have had lower content-specific skills in language arts and mathematics. The statistical analysis of the data for research 5 appeared to support that notion and further suggest that the same pattern of differences existed in each of the high schools.

However, the discussion of research question 3 indicated that there were significant differences among the high schools across MCT scores. This would imply that statistically significant differences should have been found between high schools across the basic skill area MCTs, rather than results which paralleled district-wide MCT basic skill area differences. These results lead to several questions:

1. What are the similiarities and differences in instruction, curriculum, supervision or remediation in the high schools that may have contributed to the significant differences found between schools on general MCT scores?

2. What are the similiarities and differences in instruction, curriculum, supervision or remediation in the high schools that may have contributed to the similiarities found in individual and district-wide basic skill area MCT scores?

3. Are the differences between pairs of high schools on MCT scores as found in research question 3 within an acceptable limit in light of the similiar patterns between district-wide MCT scores and individual high school MCT scores as found in research questions 4 and 5?

A comparison of the mean scores for each basic skill area MCT at the individual high schools indicated similiarities between Manual High School and Peoria High School and similiarities between Woodruff High School and Richwoods High School. However, within these two groupings, a statistically significant difference existed between Language Arts and Reading MCT scores and between Reading and Mathematics MCT scores. This may be interpreted to mean that a common variable existed across all high schools which may have influenced language arts and mathematics skill acquisition. Further research should consider course offerings and enrollment, instructional styles, and curricular and remedial materials used at each high school to uncover any similiarities. For example, the number of courses offered in advanced Mathematics may be more similiar at Woodruff High School and Richwoods High School than at Manual High School and Peoria High School. In addition, if the enrollment in the advanced mathematics courses was greater at Woodruff High School and Richwoods High School, one would expect greater mathematics skill acquisition to be occurring at Woodruff and Richwoods than at the other two high schools. This may be true, if one uses the mean scores for the Mathematics MCTs as an indicator. However, if as the findings of this study indicated, the same pattern of statistical significance existed for district-wide MCT scores as individual high school MCT scores, then course content alone may not have been a significant contributor to MCT scores. There must have existed some common element across high schools which would account for differences between individual high school MCT scores yet similiarities between district-wide and individual high school MCT scores along basic skill areas. Clearly, the need exists for further research to consider such issues as whether content among the sequence of courses at each high school was comprehensive, whether instructional styles included a variety of teaching styles, and whether the content at each of the high schools in specific courses related to MCT skills was similiar.

A recommendation regarding the degree to which these differences would be acceptable can be made only after investigations which pursue the degree to which common variables contribute to the differences between Language Arts, Mathematics and Reading MCT scores have been completed. Certainly, the differences may be attributed to individual differences in the type of student that attends each high school. Descriptive statistics have revealed differences in ability test scores, mean G.P.A., mean absenteeism and truancy, and mean ages of the subjects in each high school. Yet these differences may be acceptable as contributing to differences in high school MCT scores only after all other aspects of the educational program have been examined for consistency.

Analyses of the data for this research question revealed a heretofore uncovered dimension regarding the differences between high school and district-wide MCT scores. Although there are differences among the high schools in a general sense along MCT scores, when basic skill area MCT means were evaluated for the district and for individual high schools, strikingly similiar patterns emerged. There is the implication that the overall MCT scores for the high schools were dissimiliar to each other, yet the basic skill area MCT scores were compatible with that which might be expected for the district. This discrepency requires additional research in light of the curricular, remedial and supervisory implications that are inherent in the results.

In summary, the results of this study in responding to the research questions raised some issued that must be examined by educational planners. In the district under investigation, the difference in the level of achievement for each of the high schools was statistically significant, yet the pattern of achievement for each high school on the MCTs replicated the district-wide pattern. This suggests several implications for curriculum, instruction and future research:

1. The current curriculuar and instructional patterns in reading should be maintained. The subjects in this study demonstrated satisfactory reading skill acquisition on the MCTs.

2. Curriculum, instruction and evaluation in the content areas of language arts and mathematics should be evaluated to assure close linkages across high schools. Subjects in this study demonstrated content-specific skills that were lower than reading skills. This disparity may be a result of disparities between content, instruction and/or evaluation and bears investigation and strengthening.

3. The differences between high schools should be further examined. Patterns of instruction, supervisory relationships, evaluation and other aspects of the educational program should be examined to investigate how Manual High School and Peoria High School differ from Woodruff High School and Richwoods High School. This information could contribute to an understanding of the difference in levels of achievement between the pairs of high schools and a determination may be made of how educational programming may deal with that difference.

4. The profiles of normative and performance variables for subjects at each high school, in each basic skill area MCT, and at each TAD should be carefully analyzed by supervisors and teachers to determine programming changes, proactive or reactive instruction, instructional delivery strategies, or other efforts that might enhance student performance on the MCTs.

This chapter has provided discussion of the results of this investigation and has included recommendations for curriculum, instruction, supervision and future research. Chapter 6 will profide a brief summary of all phases of the study and specific recommendations in the areas of curriculum and instruction, supervision and recommended future research.

CHAPTER 6

SUMMARY

This ex post facto study focused on the relationship of selected normative variables, performance variables and high school MCT scores in a large public school system which had an MCT program. An examination of the literature revealed support for investigating the relationship of the normative and performance variables and high school MCT scores. Although students and the schools have little control over the normative variables, the inclusion of normative variables in a predictor profile for MCT scores can contribute valuable information when considered with those performance variables over which the schools and students can exercise some control.

Based on the supportive research and rationale, the following research questions were pursued:

1. What is the order of influence of the normative variables and the performance variables on district-wide MCT scores on designated test administration dates?

2. What is the order of influence of the normative variables and the performance variables on MCT scores by high schools?

3. Is there a significant difference in MCT scores among high schools?

4. Is there a significant difference in district-wide MCT scores among the three basic skill areas?

5. Is there a significant difference in MCT scores among the three basic skill areas by high school?

The study was conducted using archival data on the class of 1980 in the Peoria Public Schools, Peoria, Illinois. The Peoria Public Schools enrolled 21,282 students in 32 elementary schools, four high schools and one alternative high school during the 1979-1980 school year. In the four high schools and one alternative high school, the 5,919 secondary students were required to enroll in a course of study to complete one of the requirements for high school graduation. The courses of study available for the secondary students were: General Education, Business and Commercial, College Preparatory, Special Programs, or Trades and Technical.

In addition to meeting state requirements for a high school diploma, students in the Peoria Public Schools were also required to meet local requirements. The local requirements included achieving a score of at least 70% on locally-developed MCTs in the basic skill areas of Language Arts, Mathematics and Reading. The 1405 students in the graduating class of 1980 were the first group of students to whom the MCT graduation requirements applied.

For the purposes of this study, a sample size of 350 was chosen. However, due to incomplete records on some subjects, the final sample size was reduced to 300 subjects. Subject data were collected on normative variables (age, sex, race and ability test scores) and performance variables (high school course of study, G.P.A., absenteeism and truancy). MCT scores for the subjects in each of the three basic skill areas were also collected.

The data were subjected to several multiple regression analyses, an analysis of variance and several t-tests for dependent samples to respond to the research questions posed. The findings of this study may be summarized as follows:

When multiple regression analyses were applied to the data, the resultant predictor equations for MCT scores indicated the variable course of study demonstrated a significant relationship with MCT scores. This relationship was found to exist for Language Arts and Reading MCT scores district-wide on designated test administration dates; a similiar relationship was found across all basic skill area MCTs across high schools. Although in several predictor equations, the variable course of study carried negative weights, the relative magnitude of the partial regression coefficients for course of study indicated the degree to which each course of study enhanced MCT scores. Other variables which appeared as statistically significant predictors of MCT scores were G.P.A., race, STEA and age for district-wide MCT scores on designated test administration dates. By high school, other variables which appeared as statistically significant predictors of MCT scores were G.P.A., race, STEA, sex, age, and absenteeism.

Additional findings included significant differences in the levels of MCT achievement between pairs of high schools in the district. The pattern of significant differences between basic skill area MCT scores was similiar for the district and for individual high schools.

The findings of this study suggested specific recommendations for curriculum and instruction based on feedback from MCT scores:

1. An examination should be made of the way reading competencies of secondary school students are measured in the classroom and the way reading competencies of secondary school students are measured on the MCTs.

Some results of the study suggested a disparity between these two evaluative measures. The competencies measured by MCT performance should parallel the competencies measured by classroom indices.

2. Efforts should be made to assure the skills tested on the MCTs are taught in the classroom. This is particularly important when the MCT requirement is tied to high school graduation.

3. The academic requirement of each course of study should be evaluated to determine if the scope and sequence of courses within a particular course of study contributes to MCT performance. This pursuit should also include an identification of the characteristics of courses of study that contribute to the development of positive attitudes towards education.

4. Factors identified through research as contributing to a more positive academic orientation for minority students should be incorporated into the classroom environment, particularly at those high schools with high minority populations.

5. For students enrolled in courses of study which contributed to a lower opportunity to learn, efforts should be made to assure close linkages between curriculum and evaluation.

6. Differences in instructional styles and classroom process variables may contribute to a difference in the quality of instruction between high schools. An examination of the differences between Richwoods High School and the other high schools may help to explain why absenteeism was a statistically significant predictor of Mathematics MCT scores for Richwoods High School and not for any other high school.

7. Efforts should be undertaken to develop an on-going systematic monitoring system to assure that the MCTs continue to be valid for the population to whom they are administered and for the purposes intended.

8. In the basic skill areas of Language Arts and Mathematics, sound linkages must be made between content-specific skills and competencies evaluated on the MCTs. With district-wide and individual high school MCT scores indicating acceptable reading competencies, the significant differences found between Language Arts and Mathematics MCT scores may reflect the need to monitor that specific skills measured on the MCTs in language arts and mathematics are taught in the classroom.

The results of this study further suggested specific recommendations for supervision based on feedback from MCT scores:

1. A needs assessment should be undertaken to determine the degree of instructional style variation among the staff. Based upon the results of this assessment, in-service should be developed to assist classroom personnel in developing proficiency in a repertoire of instructional styles to promote student achievement motivation.

2. Supervisors should undertake personal evaluations of supervisory style to investigate the degree of interpersonal relationships developed between themselves and teachers. Efforts should be made to increase the degree of interpersonal skills used between supervisor and teacher so as to contribute to the degree which supportive interpersonal skills are used by the teacher in the classroom.

3. Supervisors should develop on-going systematic evaluations of classroom instruction to determine the degree to which the content recommended in the curriculum guides is taught in the classroom.

4. Supervisors should familiarize themselves with those instructional patterns which contribute to student skill acquisition. This can lead to effective supervision through the recommendations to teachers of specific instructional styles that would compliment student skill acquisition.

5. If parallels do exist between curriculum and evaluation of skills on the MCTs, supervisors should remain vigilant to assure these compatibilities continue.

6. Supervisors should gain familiarity with the predictor profiles developed in this study for the basic skill area MCTs for the schools for which they are responsible. An understanding of the unique profile of the student at each high school by basic skill area can assist supervisors in making curricular and instructional recommendations.

The results of this study also indicated specific recommendations for further research:

1. Investigations should be pursued into the learning characteristics of minority students and over-age-for-grade students. These students have been identified as belonging to a group of students who have the potential for difficulty on MCTs in the district under investigation. Knowledge of the learning characteristics of this sub-population can contribute to efforts to improve MCT performance.

2. The effects of the MCT remediation course on student achievement should be investigated. This investigation should examine the consistency of instruction and materials used for both the optional remediation course and the required remediation course at each high school.

3. Researchers should pursue the similiarities and differences between what is an accepted measure of achievement in the classroom (G.P.A.) and an accepted measure of achievement for graduation (MCTs). Assurances should be made that these two measures provide similiar indications of achievement to students. If research indicates these two measures are not similiar, efforts must be made to strengthen the relationship between the educational program and the testing program.

4. At Peoria High School, the mean subject age was higher than at any other high school. The factors which may have contributed to this group of subjects being older should be investigated, as the variable age has been identified as a statistically significant predictor of MCT scores.

5. Research into the differences in student opportunity to learn in the various courses of study may contribute to an understanding of why specific courses of study carried different relative weights in the predictor equations for MCT scores.

6. Pairs of high school in the district under investigation indicated significant differences in MCT scores which may have been influenced by differences in instructional styles at the schools. An analysis of the similiarities and differences in instructional styles between the pairs of high schools may assist in explaining the statistically significant differences in MCT scores.

At the beginning of this study, it was noted that interest in the MCT movement had generated large quantities of research into a wide variety of issues. However, little if any research attempted to address the curricular and instructional questions of any district whose educational program included an MCT element. The answers to curricular and instructional questions can be formulated only after an understanding of the relationship between student characteristics and the MCTs has been investigated. Clearly there is the need for further research into the relationship between student characteristics and MCT scores. The results of this study may contribute in some small way by assisting a district to better understand the unique relationship between the students in the district and MCT scores.

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